S. HRG. 102-5 (Pt. 5)

NATIONAL ENERGY SECURITY ACT OF 1991

(Titles XII and XIII)

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

ON

S. 341

TO REDUCE THE NATION'S DEPENDENCE ON IMPORTED OIL, TO PROVIDE FOR THE ENERGY SECURITY OF THE NATION AND FOR OTHER PURPOSES

MARCH 5, 1991

PART 5

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NATIONAL ENERGY SECURITY ACT OF 1991

(Titles XII and XIII)

TUESDAY, MARCH 5, 1991

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:32 a.m., in room SD-366, Dirksen Senate Office Building, Hon. Wendell H. Ford, presiding.

OPENING STATEMENT OF HON. WENDELL H. FORD, U.S. SENATOR FROM KENTUCKY

Senator FORD. Good morning, ladies and gentlemen. We are overwhelmed this morning by the interest in this hearing and I am the only one they could find to show up. So hopefully we will move along expeditiously. But Senator Johnston will be here later, and I am very pleased to give him some relief.

Today the Committee on Energy and Natural Resources will receive testimony on the nuclear provisions of S. 341. Unfortunately, the full committee chairman, Senator Johnston, has been waylaid out of town and will not be able to preside over today's hearings. That is unfortunate.

The nuclear provisions of S. 341 are largely the work of Senator Johnston. These provisions build on the advanced reactor legislation introduced in the last Congress. Nuclear power plants now supply nearly 20 percent of our electricity. This is a significant portion of our overall energy consumption.

There are 111 nuclear plants operating today. These plants supplant approximately 740,000 barrels of oil every day. That is about the same amount that we imported from Iraq and Kuwait before the invasion last August. These existing plants have provided a reliable supply of base load capacity.

Between 190,000 and 275,000 megawatts of new generating capacity will be needed by 2010. Much of that capacity will necessarily be base load. Nuclear must be considered a competitive option as we struggle to meet the need.

The nuclear provisions of S. 341 are intended to encourage the commercialization of new nuclear reactor designs. The bill sets up two types of nuclear demonstration projects. One of these could be a full-scale demonstration of new technology. For a full-scale demonstration, the costs will be shared on a 50-50 cost-shared basis with the Federal Government and private enterprise.

[The text of titles XII and XIII and the prepared statement of Senator Johnston follow:]

102D CONGRESS
1ST SESSION

S. 341

To reduce the Nation's dependence on imported oil, to provide for the energy security of the Nation and for other purposes.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 5 (legislative day, JANUARY 3), 1991

Mr. JOHNSTON (for himself and Mr. WALLOP) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

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A BILL

To reduce the Nation's dependence on imported oil, to provide for the energy security of the Nation and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be referred to as the "National Energy Security Act of 1991".

* * * * * * *

TITLE XII—ADVANCED NUCLEAR REACTOR COMMERCIALIZATION

SEC. 12001. SHORT TITLE.

This title may be cited as the "Civilian Advanced Nuclear Reactor Commercialization Act of 1991.".

SEC. 12002. FINDINGS, PURPOSES, AND DEFINITIONS.

(a) FINDINGS.—Congress finds that—

(1) energy generated from nuclear fission now supplants the burning of fossil fuels in an economical fashion and contributes substantially to safe and reliable supplies of electricity while reducing the rate and scope of environmental pollution; and

(2) it is in the national interest for the Federal Government to provide leadership in encouraging advanced nuclear reactor technologies so that such technologies may be adopted as needed.

(b) PURPOSES.—The purposes of this title are to—

(1) require the Secretary to make decisions that will focus the Department's civilian nuclear programs

in a way that will lead toward commercialization of advanced nuclear reactor technologies;

(2) authorize the Secretary to encourage the use where needed of advanced nuclear reactor technologies; and

(3) ensure the timely availability of advanced nuclear reactor technologies, including technologies that exhibit passive safety features.

(c) DEFINITIONS.—For purposes of this title, the term—

(1) "advanced nuclear reactor technologies" includes, but is not limited to, advanced light water reactors; modular high-temperature, gas-cooled reactors; and liquid metal reactors, for the generation of commercial electric power from nuclear fission.

(2) "Commission" means the Nuclear Regulatory Commission;

(3) "Department" means the Department of Energy; and

(4) "Secretary" means the Secretary of Energy.

SEC. 12003. PROGRAM.

(a) The Secretary shall carry out a comprehensive program in accordance with the provisions of this title to encourage the deployment of advanced nuclear reactor technologies that to the maximum extent practicable—

(1) are cost-effective in comparison to alternative sources of commercial electric power of comparable availability and reliability; including consideration of the impact on the rate and scope of global climate change;

(2) utilize modular construction techniques;

(3) facilitate standardized design, construction, licensing, and operation;

(4) exhibit passive safety features; and

(5) incorporate features that advance the objectives of the Nuclear Nonproliferation Act by discouraging diversion of fissile material for use in nuclear weapons.

(b) CERTIFIED DESIGNS.—(1) The program of the Secretary under subsection (a) shall include appropriate steps for the development and submission for certification by the Commission of completed standard designs for commercial nuclear reactors, or the components thereof, that the Secretary determines exhibit some or all of the characteristics set forth in subsection (a).

(2) The Secretary shall provide Congress with an annual report describing the progress in the previous year in certifying standard designs under paragraph (1) and setting forth plans for the certification program for the coming year.

SEC. 12004. DECISIONS BY THE SECRETARY.

(a) PUBLIC MEETINGS.—Within sixty days after the date of the enactment of this title, the Secretary shall commence public meetings to develop information upon which to base the decisions and recommendations required by this section.

(b) PUBLIC MEETINGS ON FUTURE PROGRAM.—These public meetings shall examine—

(1) the need for, and the potential for adoption in the future by electric utilities or other entities of, advanced nuclear reactor technologies that are available or under development for the generation of energy from nuclear fission;

(2) how the Federal Government, acting through the Secretary (including actions of the Secretary under this title), can be effective in ensuring the availability of these advanced nuclear reactor technologies when they may be needed;

(3) whether the Secretary should solicit cooperation from the private sector in carrying out the advanced nuclear reactor technology commercialization programs authorized in sections 12005 and 12006; and

(4) potential alternative funding sources to carry out the purposes of this title.

(c) In carrying out the public meetings under subsection (a) the Secretary shall offer members of the public an oppor-

tunity to provide information and comment and solicit the views of the Commission and other interested parties.

(d) REPORT.—(1) The public meetings shall conclude no later than one hundred and eighty days after the date of the enactment of this title.

(2) Within ninety days after the conclusion of the public meetings the Secretary shall submit to Congress a report summarizing the results of the public meetings and setting forth the Secretary's plan for carrying out the purposes of this title. The report shall indicate how the Secretary's plan will further the purposes set forth in section 12002(b) and the objectives set forth in section 12003(a). In developing the plan the Secretary shall take into account—

(A) the views received during the public meetings;

(B) the need, as determined by the Secretary, for available commercial electric power supply technologies based on nuclear fission and the time when necessary action to satisfy this need will become urgent; and

(C) the probability that the Secretary's actions under this section will contribute substantially to the availability of commercial electric power from advanced nuclear reactor technologies.

(e) DECISIONS ABOUT FUTURE COMMERCIALIZATION PROGRAMS.—As part of the report under subsection (d) the

Secretary shall issue a decision whether or not to conduct the solicitations authorized under sections 12005 and 12006, together with the reasons for this decision.

SEC. 12005. COMMERCIALIZATION OF NUCLEAR REACTOR TECHNOLOGY.

(a) USE OF AUTHORITY OF THE SECRETARY.—The Secretary shall use the authority under this section and other authorities available to the Secretary to encourage the siting, financing, licensing, construction, and operation of facilities for the generation of commercial electric power from nuclear fission in regions where the Secretary, after consultation with appropriate agencies in the affected States, finds a need for additional electric generating capacity.

(b) SOLICITATION.—(1) At any time after publication of the report under section 12004(d), the Secretary, in consultation with the Commission, may solicit proposals for collaboration with one or more private parties who agree to become applicants for necessary permits for the construction and operation of facilities for the generation of commercial electric power from nuclear fission. In any solicitation under this subsection, the Secretary shall offer, in the case of accepted proposals, to—

(A) assist in the identification of private financing arrangements that to the maximum extent practicable

under existing law minimize the risk in financing the construction and operation of the proposed facility;

(B) appear on behalf of applicants before any authority, including the Commission or appropriate State and local regulatory authorities, with jurisdiction over the proposed facility;

(C) be responsible for the costs of any new requirements imposed by the Commission after issuance by the Commission of a license for the construction of the proposed facility: *Provided*, That the Federal Government shares equitably in the revenues from operation by the facility; and

(D) otherwise seek to expedite the construction and operation of the proposed facility using authority available to the Secretary.

(2) Any person may petition the Secretary requesting an additional solicitation pursuant to paragraph (1). If the Secretary determines such solicitation would advance the purposes of this title, the Secretary shall solicit proposals.

(c) COMMENT.—The Secretary shall offer an opportunity for interested persons, including the Commission, to comment on any proposal received under subsection (b). The Secretary shall offer technical assistance to any applicant whose proposal shows promise for selection under this section and shall permit such applicant to modify his proposal. The Sec-

retary shall consult with the Commission on ways to improve the prospects for licensing any proposed facility that may be acceptable under this section.

(d) SELECTION.—(1) Within one hundred and eighty days after receipt of a proposal under subsection (b), the Secretary shall decide whether to select any proposal submitted under this title.

(2) The decision to accept any proposal shall be transmitted promptly to Congress, and not less than forty-five calendar days shall pass before such decision is effective.

(3) The interpretation and application of the selection criteria set forth in subparagraphs (A) through (F) are within the sole discretion of the Secretary. In deciding whether to select a proposal under this section, the Secretary shall take into account—

(A) the extent to which the technology proposed exhibits the characteristics set forth in section 12003(a);

(B) whether acceptance of the proposal will encourage use of a standard reactor design for the technology in question;

(C) the probability that the facility can be successfully financed, constructed, and licensed;

(D) the probability under the proposal that the Federal Government will receive an equitable share of revenues from operation of the proposed facility;

(E) the importance of the Secretary's contribution under this section to successful construction and operation of the proposed facility; and

(F) the extent to which the successful construction and operation of the facility will improve the availability of nuclear reactor technologies for generating commercial electric power.

(4) If the Secretary determines that no proposals submitted pursuant to subsection (b) are acceptable, the Secretary may solicit additional proposals.

(e) FUNDING.—To the extent provided in advance in appropriations Acts, the Secretary may provide funds to cover costs referred to in subsection (b)(1)(C).

(f) LICENSING.—(1)(A) The facilities covered by any proposal selected under subsection (d) shall be subject to Commission licensing as provided by the Atomic Energy Act of 1954, as amended by title XIII of this Act, and this paragraph.

(B) The Commission may issue a combined construction permit and operating license for a facility covered by a proposal selected under subsection (d) after providing an opportunity for a hearing under section 189a. of the Atomic

Energy Act, if the Commission finds that there is reasonable assurance that the facility will be constructed and will operate in conformity with the application for the facility, applicable provisions of the Atomic Energy Act, and applicable regulations of the Commission. The Commission shall ensure through inspections, tests and analyses that construction is completed in conformity with the combined construction permit and operating license.

(C) Before operation of any facility licensed under this subsection, the Commission shall publish in the Federal Register a notice of the intended operation of the facility, and shall provide a thirty-day period within which any person whose interest may be affected may file a written objection to operation of the facility on the ground that the facility has not been constructed or will not operate in conformity with the license. The objection must set forth with specificity and in reasonable detail the facts and arguments upon which the objection is based, and may be accompanied by a request for a hearing. Unless a prior hearing is granted in accordance with the requirements of this subsection, operation of the facility shall commence and the Commission shall publish a brief statement of any issues raised in the objection and their resolution by the Commission.

(D) The Commission may grant a hearing under this subsection only if—

(i) a showing is made that a substantial dispute of material fact exists that has not been previously considered by the Commission and that cannot be resolved with sufficient accuracy except at a hearing; and

(ii) a showing is made that there has been nonconformance with the combined license that has not been corrected and that could materially and adversely affect the safe operation of the facility.

Following completion of any hearing, the Commission shall decide whether or not to modify or condition the license.

(2) Within two years after selection of a proposal under subsection (d), the Secretary shall recommend to the Commission any changes in Commission regulations that would improve, consistent with existing law, prospects for the successful licensing of the facilities covered by such proposal.

SEC. 12006. COMMERCIALIZATION OF ADVANCED REACTOR TECHNOLOGY.

(a) USE OF AUTHORITY OF THE SECRETARY.—The Secretary shall use the authority under this section and other authority available to the Secretary to commercialize promising advanced nuclear reactor technologies for the generation of commercial electric power.

(b) REQUEST FOR PROPOSALS.—

(1) Within ninety days after the publication of the report under section 12004(d), the Secretary, after con-

sultation with the Commission, may issue a draft request for proposals for the construction of a commercial-scale reactor employing advanced nuclear reactor technology that—

(A) exhibits the characteristics set forth in section 12003(a);

(B) minimizes to the extent practicable the volume or toxic lifetime of nuclear waste produced and the cost of nuclear waste disposal;

(C) is reasonably designed to maximize acceptance by the public, the financial community, electric utilities, State electric utility regulators, and the Commission; and

(D) could provide commercial electric power to a utility grid as soon as practicable but no later than the year 2010.

(2) Any proposal under paragraph (1) shall—

(A) set forth the management structure for the project specifying a single entity that will be in control of the project; and

(B) indicate how this structure ensures timely operation of the facility within the budget proposed.

(3) The Secretary shall offer an opportunity for interested persons to comment on the draft request for

proposals. The Commission shall comment on such draft request. The Secretary shall consider and publish a summary response to any comments received within ninety days after issuance of the draft request for proposals.

(4)(A) Within one hundred and eighty days after publication of the report under section 12004(d)(2), the Secretary may issue a request for proposals under this section. Final proposals may be submitted to the Secretary within one hundred and eighty days after the request for proposals is issued under this paragraph, except that the Secretary may extend this deadline for up to an additional one hundred and eighty days if the Secretary determines that such extension is necessary to permit promising proposals to be submitted.

(B) The Secretary may provide technical assistance for the development of proposals the Secretary considers promising.

(C) The Secretary may modify and reissue the request for proposals under subparagraph (A) so as to encourage the submission of additional proposals if, in his judgment—

(i) there will be insufficient competition among the proposals received under this section; or

(ii) there are promising advanced nuclear reactor technologies which are not represented in the proposals received and receipt of proposals representing such technologies would foster competition or advance the purposes of this title.

(5)(A) The Secretary shall decide whether to select any proposal received under this section within one hundred and eighty days after the corresponding initial proposal is submitted.

(B) The decision to accept any proposal shall be transmitted promptly to Congress, and not less than forty-five calendar days shall pass before such decision is effective.

(C) The interpretation and application of the selection criteria set forth in clauses (i) through (vii) are within the sole discretion of the Secretary. In deciding whether to select a proposal under this section, the Secretary shall take into account—

(i) the extent to which the advanced nuclear reactor technology proposed exhibits the characteristics set forth in section 12003(a);

(ii) the probability that the commercialization project can be successfully financed, constructed, and licensed;

(iii) the importance of the Federal contribution under this subsection to successful commercialization of the technology proposed;

(iv) the extent to which the successful construction of the project will improve the availability of advanced nuclear reactor technologies;

(v) the probability that technology and design features exhibited by the project can be deployed commercially by the utility industry in a timely fashion;

(vi) the probability under the proposal that the Federal Government receive an equitable share of revenues from operation of the proposed facility; and

(vii) the extent to which selection of the project otherwise furthers the purposes of this title.

(c) FUNDING.—To the extent provided in advance in appropriations Acts, the Secretary may provide funds for construction of a commercialization project under an acceptable proposal selected under subsection (b). Such funds may be provided only if the proposal selected by the Secretary provides for—

(1) at least 50 per centum of project costs to be provided from non-Federal sources; and

(2) non-Federal financial responsibility for any and all costs in excess of the specific amounts authorized by the Secretary to be paid under the accepted proposal.

(d) LICENSING.—(1) Any project under this section shall be subject to licensing requirements of the Atomic Energy Act of 1954, as amended, as if such project were a commercial utilization facility under such Act, and may be issued a combined construction permit and operating license in accordance with the provisions of section 12005(f)(1).

(2) Within one year after selection by the Secretary of a proposal under subsection (b), the Secretary shall recommend to the Commission any changes in Commission regulations that would improve, consistent with existing law, prospects for the successful licensing of the commercialization project under this subsection.

SEC. 12007. APPROPRIATIONS.

(a) No more funds may be appropriated to carry out the purposes of this title set forth in section 12002(b) than the amounts set forth in subsection (b). This title shall be the exclusive source of authorization for appropriations of funds to support any activities of the Secretary leading to the commercialization of advanced nuclear reactor technologies.

(b)(1) For the fiscal year beginning on October 1, 1992, not more than $100 million may be appropriated for activities described in subsection (a);

(2) For the fiscal year beginning October 1, 1993, not more than $200 million may be appropriated for activities described in subsection (a); and

(3) For the fiscal year beginning October 1, 1994, not more than $200 million may be appropriated for activities described in subsection (a).

SEC. 12008. REPORTS.

(a) RECOMMENDATIONS BY THE COMMISSION.—

(1) Within two years after the selection of a proposal under section 12006, the Commission, after consultation with the Secretary and opportunity for public comment, shall submit to Congress specific recommendations for changes in law that the Commission finds necessary for the timely licensing, consistent with the public health and safety, of commercial nuclear power reactors whose design is based on the project under section 12006.

(2) The Secretary shall provide Congress with the comments on the recommendations of the Commission submitted under paragraph (1).

(b) REPORT BY THE COMMISSION.—

(1)(A) In order to assess whether the purposes of this title may be achieved in whole or in part by the availability in the United States of advanced nuclear reactor technologies already in use or under development in other nations, the Secretary shall review commercial nuclear reactor technologies in use or under development in other nations and, within one year after the date of the enactment of this section, provide Congress and the Commission with an initial assessment of the extent to which any such technologies may exhibit characteristics set forth in paragraphs (1), (2) and (4) of section 12003(a).

(B) If the Secretary finds that a technology reviewed under subparagraph (A) has the potential to exhibit such characteristics, he shall identify the technology and include a thorough discussion of his findings in the assessment under this paragraph.

(2) Within one year after receipt of the Secretary's initial assessment under paragraph (1), the Commission shall report to Congress on the problems of licensing under the Atomic Energy Act of 1954, as amended, of commercial nuclear reactor technologies that the Secretary has identified under subparagraph (1)(B).

(3) Before submitting the report under paragraph (2) the Commission shall make available to the public a draft report and provide opportunity for comment on the draft report.

(4) The report of the Commission under paragraph (2) shall identify specific impediments to licensing under the Atomic Energy Act of 1954, as amended, for each technology considered and shall indicate how, or if, such impediments might be removed by amendments to law or regulation consistent with the public health and safety.

(c) REPORT BY THE SECRETARY.—The Secretary, in consultation with the Commission, shall submit an annual report to Congress on activities under this title assessing the progress during the previous year in achieving the purposes of this title and the prospects for further progress in the coming year.

TITLE XIII—NUCLEAR REACTOR LICENSING

SEC. 13001. SHORT TITLE.

This title may be cited as the "Nuclear Reactor Licensing Act of 1991.".

SEC. 13002. REACTOR LICENSING.

Section 189a. of the Atomic Energy Act of 1954 (42 U.S.C. 2239(a)) is amended by redesignating paragraph (1) as paragraph (1)(A) and inserting the following:

"(B) In the case of an application for a combined license to construct and operate a facility under subsection 161h., the Commission shall hold a hearing on such application prior to the granting of the combined license. Upon the completion of construction of the facility and upon finding the facility authorized has been constructed and will operate in conformity with the combined license, and in the absence of any good cause being shown to the Commission why operation should not proceed in accordance with the combined license, operation may proceed notwithstanding the pendency before the Commission of a request for a hearing under this section unless:

"(i) a showing is made that a substantial dispute of material fact exists that has not been previously considered by the Commission and that cannot be resolved with sufficient accuracy except at a hearing; and

"(ii) a showing is made that there has been nonconformance with the combined license that has not been corrected and that could materially and adversely affect the safe operation of the facility.

"Any hearing held under this section after the granting of a combined license to construct and operate a facility shall be limited to issues of nonconformance with the combined license.".

* * * * * * *

PREPARED STATEMENT OF HON. J. BENNETT JOHNSTON, U.S. SENATOR FROM LOUISIANA

Good morning and welcome to the Committee's hearing today on the nuclear provisions of S. 341. If the United States is going to have a balanced and credible energy policy, it must include strong provisions to revive the nuclear option. For too many years, we have allowed ourselves to adopt a de-facto moratorium on nuclear development in this country. It has been easy and popular to fight development of nuclear power. And we, as policymakers, have not done enough to make nuclear more palatable to the American public.

A balanced energy policy must contain many components. It will contain some strong pro-development components—like nuclear which conservationists will not like. But that will be balanced by bold initiatives in conservation and energy efficiency. By including all of these elements, however, we will have a balanced package. Only then will we have a strong policy that will take us into the next century.

Nuclear power must remain a viable energy option in this country. Nearly 20 percent of our electricity comes from nuclear power plants. Without the 111 nuclear plants operating today, U.S. utilities would be using an additional 740,000 barrels of oil a day for power generation. This is about the same amount that we imported from Iraq and Kuwait before the invasion last August.

As we move into the 21st century, some of those plants will reach the end of their expected operating life. These plants have provided a reliable supply of baseload capacity that we cannot afford to lose. This is not just a question of whether we build new plants to meet an increasing demand for electricity. It is a matter of having adequate capacity simply to hold the line on current supply. As currently operating plants move into retirement, this capacity must be replaced.

Some 200,000 megawatts of new generating capacity is estimated to be needed over the next two decades. A significant portion of that capacity required must be baseload. Nuclear simply must be available as an option for utilities who will need to build new baseload capacity.

In order to build new plants, we must be sure that the technology is proven and that there is a product on the shelf to be built. Utilities need to be sure that the product will be licensable and cost-effective. These plants must satisfy public concerns about safety and the environment, or they will not be built. We need to plan now to be able to meet these needs in the future.

Title XII takes the first step toward meeting those needs by encouraging the commercialization of new reactor designs that are safer, less costly, and easier to build than the present generation of plants. Title XII would set forth a process for the Secretary of Energy to make decisions on whether to develop and demonstrate new technologies. The bill would authorize two types of demonstration projects for new technologies that could be supported in part by the Department of Energy. One of these projects envisions a full-scale demonstration of technology if the Secretary decides that is worthwhile.

I personally believe that we should commit to the building of a demonstration project utilizing advanced technology. I believe that if we can build and convincingly demonstrate the safe operation of a new reactor then we will have made great strides toward the revival of nuclear power in this country. That is not to say that our current reactors are unsafe—in fact, their safety record is quite enviable. But I believe we must work harder to convince the public of that safety.

Finally, title XIII of S. 341 would clarify the authority of the Nuclear Regulatory Commission to implement its licensing reform rule. Title XIII would amend existing law to make it clear that the Commission has the authority to limit any pre-operational hearing to questions of whether the plant was built in conformance with its construction license. We simply cannot continue to litigate over and over again issues that have been already been resolved once in the licensing process.

I look forward to the testimony from today's witnesses. The nuclear provisions of S. 341 are intended to encourage the continued development and utilization of nuclear-generated electricity in the U.S. I am most interested in hearing today from witnesses about the adequacy of the process laid out in the legislation.

Senator FORD. We have a distinguished set of witnesses today and I personally look forward to their testimony. The nuclear provisions of S. 341 are intended to encourage the continued development and utilization of nuclear-generated electricity in the United States, and we will be interested in hearing from the witnesses about the adequacy of the process laid out in the legislation.

The distinguished ranking member of the committee is here and I look forward to working with you this morning. I told them earlier that any port in a storm would do, so they found me.

STATEMENT OF HON. MALCOLM WALLOP, U.S. SENATOR FROM WYOMING

Senator WALLOP. Mr. Chairman, thanks. I have a statement which, in the interest of time, I would just like to have inserted in the record.

But I think it is a given that one cannot be serious about an energy strategy without a serious consideration of the increased role that nuclear must be able to play. If you are interested environmentally and in the consequences of global warming, which many on this committee have expressed concerns about, if you are interested in backing out oil, if you are interested in the breadth and dimension of energy supplies, you simply cannot ignore the nuclear part of that equation. I look forward to the hearing.

[The prepared statement of Senator Wallop follows:]

PREPARED STATEMENT OF HON. MALCOLM WALLOP, U.S. SENATOR FROM WYOMING

Our growing dependency on foreign oil is a reminder of the consequences of our failure to develop a comprehensive energy policy. Perhaps one of the most senseless results of that inertia is the stagnation of the nuclear power industry.

We have come close to eliminating one of our most reliable and environmentally benign options for electricity generation at a time when we need it the most. As we face rising demand for electricity and worry about acid rain and global warming, we have cobbled together a cumbersome, protracted licensing process that has discouraged development of new nuclear technologies.

Certainly, the nuclear industry is not blameless. However, this folly has been fueled largely by manipulated public fear that has its roots in misinformation and political demagoguery. Opponents of nuclear power justify their objections by citing the accidents at Chernobyl and Three Mile Island. Most are fully aware that the Chernobyl plant was an antiquated design which could never be licensed in this country. They also know that there were no adverse consequences from the Three Mile Island incident beyond the plant site.

U.S. nuclear energy plants have logged over 1,500 reactor yeas of safe operation in the past 30 years. An even greater margin of safety can be provided by the new advanced reactor designs which this bill promotes. Also, nuclear power plants emit no particulates, no sulfur oxides, no nitrogen oxides, and no greenhouse gases. The perpetuation of irrational fears about nuclear power is inimical to our development of a sound national energy policy.

The Department of Energy estimates that a combination of increase in demand and retirement of existing electric generation capacity will require an additional 200,000 megawatts of capacity by 2010. It would be irresponsible to deprive the nation of the only major source of electric power that is so environmentally benign.

The nuclear industry is not free of problems. But we can make giant strides toward solving some of those problems by promoting the development of advanced reactor designs and streamlining the regulatory structure to bring on line a new, safer generation of plants that will not only help meet our future energy needs but will restore public confidence in the nuclear power option.

I look forward to hearing from today's witnesses.

Senator FORD. Thank you very much, Senator Wallop.

Our first witness this morning will be Dr. Bertram Wolfe, vice president and general manager of General Electric's Nuclear Energy Division. Good morning, Doctor. We are delighted to have you with us this morning, and you may proceed however you would like to work it. You can highlight your statement. It will be included in the record, or whatever you wish to do.

STATEMENT OF DR. BERTRAM WOLFE, VICE PRESIDENT AND GENERAL MANAGER, GENERAL ELECTRIC NUCLEAR ENERGY DIVISION

Dr. WOLFE. Thank you, Mr. Ford. I really am honored to be here and appreciate the opportunity. I have given you a written statement, and what I thought I would do is briefly summarize it and then be prepared to answer whatever questions you might have.

Let me say that I believe your proposed legislation, the National Energy Security Act of 1991, its nuclear parts are very, very timely. Since the Arab oil boycott of 1973 there has been until recently a surplus of electrical generation in this country. The oil boycott caused an increase in energy costs and a consequent reduction of energy growth.

Because the electric utilities had ordered new plants before 1973 in anticipation of a doubling of need every 10 years, which was the previous history, the slow growth after 1973 left the Nation with a surplus of capacity. In this surplus, in this period of surplus, one could oppose coal plants, new dams, new nuclear plants, gas pipelines, and even geothermal power near fumaroles or potholes without any significant repercussion.

However, over the past 2 years we have had power shortages on the East Coast and in Texas, and these shortages are projected to spread and become more intense unless new capacity is added. In the next two decades, it is projected that we will require the equivalent of some 200 new large equivalent to 1,000-megawatt electric plants, generating plants, in the United States.

Worldwide, to raise the living standards of those in underdeveloped nations comprising some 80 percent of the world's population, it is estimated that several thousand plants may be required in the next 50 to 70 years, even with significant conservation efforts.

In view of the problems with fossil fuels, it may not be possible to attain such targets without an expansion of nuclear power. And if the greenhouse effect is real, nuclear power will be an absolute necessity for the national and world welfare.

I am very proud to report to you that through development programs here and abroad, the U.S. nuclear industry has maintained a lead technological position and is prepared to meet the new requirements with nuclear plants which have improved safety, improved cost and reliability characteristics.

The General Electric advanced boiling water reactor, the ABB-Construction Engineering System 80-Plus, the Westinghouse AP-600, and the GE SPWR are all advanced light water reactors and they represent designs, they have designs, which incorporate the experience from 30 years of plant operations throughout the world, and make use of new developments such as new materials and advanced solid state electronics.

The problem with expanding our U.S. nuclear capacity is not technological, but institutional. Our key problem is licensing. Let me say it is embarrassing to report that abroad it takes us 4 to 6 years to build and operate a nuclear plant using U.S. technology. In this country, due to an inefficient, unpredictable licensing system, it takes an uncertain 10 to 15 years or longer to put a plant on the line.

A program to correct this situation through the licensing of standardized plants is being worked on by the Nuclear Regulatory Commission, the Department of Energy, and the reactor manufacturers. However, I am concerned that, even with a new system, court challenges will cause continuing delays, and thus I believe it extremely important to have new legislation clarifying Congressional intent.

Titles XII and XIII of your proposed legislation address the problem, and Marc Rowden, who is a real expert on licensing law, will go into this matter in more detail.

Before leaving the subject, however, let me make it explicitly clear that I am not suggesting any lowering of safety standards. We cannot afford plants which do not meet the highest safety standards. What I am suggesting is improving our licensing system so that it becomes realistically efficient and in my view can better address real safety issues.

A second requirement for the revival of nuclear power in the United States, even with new licensing legislation, is a demonstration that in fact new plants in this country can be put on the line with predictable schedules and costs, as is done abroad. Your proposed legislation, in particular title XII, addresses this issue, and I would like to make some comments and suggestions on that section.

First, your section 12003(a) proposes certain nuclear plant features which are subject to interpretation and which could inhibit support for promising systems and allow unnecessary arguments in the future. For example, all of the new light water reactors which I mentioned above depend upon valves, relays, and other electrical or mechanical devices to put the plant into a condition where "passive" systems take over.

Ambiguities of the interpretation of "passive" could prevent support for the most promising concepts. Thus, I suggest you make clear that safety, cost effectiveness, and standardization are the prime requirements.

Secondly, it should be made clear that the interpretation of title XII is to build on and not replace existing advanced reactor programs, such as the DOE-industry evolutionary and small plant certification programs and the DOE-utility early site certification programs.

In addition, the differences between sections 12005 and 12006 should be clarified. I interpret 12005 to apply to the light water reactors and 12006 to apply to the more distant concepts, such as the breeder and gas reactors. However, it is not clear that this is the case and I think your intent should be clarified.

Finally, I would suggest that the funding indicated in section 12007 be examined. The proposed fiscal 1992 funding, for example, is less than presently proposed for the light water reactor and advanced reactor programs, these without the additional initiatives of the new legislation.

In general, I believe the funding should be flexible, under Congressional review, so that the needs of the program can be met as it progresses and details become better defined.

In summary, a major expansion of nuclear power may be vital to the Nation and the world. The U.S. industry has maintained a

technological capability to meet such needs. The key requirement is to remove unnecessary institutional restraints and to demonstrate that nuclear plants in the United States can be built as efficiently and predictably as the same plants can be built overseas.

The nuclear portions of your proposed National Energy Security Act of 1991 address these problems. I hope that my comments will be of aid in helping you to make your legislation even more effective.

Mr. Ford, Mr. Wallop, thank you very much. I appreciate it.

[The prepared statement of Dr. Wolfe follows:]

PREPARED STATEMENT OF DR. BERTRAM WOLFE, VICE PRESIDENT AND GENERAL MANAGER, GENERAL ELECTRIC NUCLEAR ENERGY DIVISION

My name is Bertram Wolfe, and I am Vice President and General Manager of General Electric's Nuclear Energy Operations. I have been actively involved in the research, development and application of nuclear power generation for over 30 years. I am a past president of the American Nuclear Society, a member of the National Academy of Engineering, and am on the Energy Engineering Board of the National Research Council. I am also on the board of the Nuclear Power Oversight Committee (NPOC) as well as those of several other industry organizations providing guidance in the nuclear energy field. I greatly appreciate the opportunity to testify before you today on the proposed legislation relating to Advanced Nuclear Reactor Commercialization (Title XII) and Nuclear Reactor Licensing (Title XIII) in the National Energy Security Act of 1991. I believe your proposed legislation is extremely timely.

I joined the nuclear industry in 1955 at the start of the peaceful nuclear power era and have watched nuclear power go through its highs and lows. We started with enthusiasm in the late Fifties, saw a negligible market in the Sixties, and witnessed the start of a boom in nuclear power in the late Sixties and early Seventies—only to see demand decline after the 1973 Arab oil boycott.

The point I want to make is that these ups and downs of nuclear power correlated directly with need. When President Eisenhower's Atoms for Peace Program started in 1954, there were only a hundred gigawatts of installed electrical capacity in the United States. Our supplies of all fossil fuels, including oil, appeared limitless, and the cost of electricity from coal was less than one cent per kilowatt hour. Clearly there was no near-term need for nuclear power.

However, electricity use was doubling every ten years, and by the mid-sixties there were increasing cleanup costs and public reaction to pollution by fossil plants, in particular, "dirty" coal. Nuclear power became a needed alternate and in the early seventies some 40 nuclear plants per year were being ordered.

After the Arab oil boycott of 1973, the growth rate of electrical usage was cut in half. Because utilities had pre-ordered plants on the basis of the previous ten-year doubling time, they ordered no more large power plants and cancel led some 80 coal plants and some 100 nuclear plants which were on order. Even then, until recently, there has been considerable excess electrical capacity in this country. Thus, one could be against coal, against oil, against nuclear, against gas pipelines, against dams, and even against new geothermal power near fumeroles and potholes—and it didn't matter. This era of excess capacity is coming to an end. We are going to need new electrical supplies and this is why I believe your proposed legislation is important and timely.

It should be noted that the 1973 Arab oil embargo affected other countries differently than the U.S., which has very large indigenous coal supplies. France has few indigenous fuel resources and had an electric supply system almost completely dependent upon imported oil. The Arab oil boycott pointed to the need to become less dependent on oil and led to a massive expansion of nuclear energy. Nuclear power now provides some 80% of France's total electric generation. In Japan, also with few indigenous energy supplies and also heavily dependent on imported oil, the boycott led to a diversification of energy sources in which nuclear energy now supplies 30% of electrical needs. With a projection of 30 large new nuclear plants in the next two decades, nuclear's share will rise to 40%.

In the United States, as our economy grows, we are steadily becoming more electricity intensive, and there are now indications that our generation capacity is not keeping up with this growth of electricity use. Without new capacity commitments, it is projected that in the 90's, even at a growth rate between 2 and 3%, we will fall

significantly below the 17% excess capacity margin required for reliable supply. Since the summer of 1988, for the first time in the past two decades, we have had electrical shortages in some parts of the country, and without new capacity such shortages are expected to become more common. In fact, there are estimates of need of 150-250 GWe of new capacity for the next two decades, the equivalent of 150 to 200 large (1000-1350 Mwe) power stations, each of which could supply the electricity for a city of over a half-million people.

Electricity is growing as the energy of choice in the United States, as it is in all industrialized nations. Electricity makes manufacturing more efficient because it provides a more stable source, improves productivity, and enhances control over product quality. Numerous examples can be found of increasing use in industry, such as the steelmaking use of electric arc furnaces and the increasing use of electricity in the refining of oil. The rapidly expanding industrial use of laser and microwave technologies are clearly dependent on a stable growing supply of electricity. It is likely that a demand for additional generating capacity will continue if we are to maintain our economic prosperity on its present course. Increased efficiency, conservation, and the use of renewable energy resources such as solar and wind power will all help satisfy the need for new electricity supplies, but will fall far short of meeting even the near term demand if the aforementioned added need of 150-250 gigawatts of electricity in the next twenty years is born out.

The two major supply alternatives for base load capacity now available are coal and nuclear energy. However, with growing concern about the greenhouse effect from burning fossil fuels, we may find ourselves in a situation where nuclear energy is the only practical means to satisfy expanded electrical use. On a global basis with increasing needs of the developing nations, this may be particularly so.

Recent papers by Dr. Chauncey Starr,[1] former head of the Electric Power Research Institute, by Professor Wolf Haefele,[2] a renowned energy authority from Germany, and by William Lee,[3] Chairman of Duke Power Company, all make the point that if the third world is to be brought out of poverty it may require more than a doubling of world energy use in the coming decades, and increased electrical supplies equivalent to thousands of large base load plants. It seems nearly impossible to meet such needs without a large expansion of nuclear power.

If, in fact, there is a need to provide new energy requirements for this nation and the world, I am pleased to report that from a technological standpoint the U.S. nuclear industry will be ready. Because of development work here and abroad and new programs in this country, I believe we will be able to bring much improved technology in advanced nuclear plants to the nation and the world.

Over the past decade General Electric, with its Japanese associates, Hitachi and Toshiba, have developed the Advanced Boiling Water Reactor (ABWR). The first of these plants, based on several hundred millions of dollars of development and design work, is scheduled to start construction this year at Tokyo Electric Power Company's Kashiwasaki site. The second ABWR at that site will begin construction next year. In Japanese style, these plants will provide needed power to Tokyo starting in 1996 and 1997 respectively. Similarly, ABB-Combustion Engineering, using its System 80 plant design being built in Korea, has developed an improved plant, the System 80+, expected to be ready for construction in the next couple of years. In addition, both Westinghouse and General Electric, in exciting international efforts supported by the Department of Energy, are developing smaller 600 MWe nuclear plants [4] which take advantage of passive safety and operating features to obtain cost and operating benefits.

All of the plants noted above take advantage of the thirty plus years of nuclear power experience to glean the best from the past and combine it with new technology such as advanced materials and solid state electronics. Thus, again let me express my pleasure at being able to report to you that the U.S. nuclear industry remains a technological leader in developing safer, more reliable, and more economic nuclear plants for the future.

The key problems inhibiting the increased use of nuclear power in this country are institutional, not technical. At the forefront of these institutional impediments is our licensing system. In Japan and France, it typically takes four to six years to build a nuclear power plant and put it into operation, and these plants produce the

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[1] Chauncey Starr and Milton P. Searl, Global Energy and Electricity Futures, Energy Systems and Policy, Volume 14.

[2] Wolf Haefele, Energy from Nuclear Power, Scientific American, September, 1990.

[3] William S. Lee, Energy for our Globe's People, The Best of Tau Beta Pi, Winter 1991.

[4] The Westinghouse plant is the AP-600. The GE plant is the Simplified Boiling Water Reactor (SBWR).

lowest cost electricity. In the U.S., with our licensing system, it now takes an uncertain ten or fifteen years and enormous attendant costs before a plant is allowed to operate. Any opponent with a smart lawyer can cause interminable delays in the licensing of even a fully constructed nuclear plant by raising eleventh-hour questions, regardless of whether they are actually substantive or germane to the basic issue of plant safety. Thus, despite the growing need for new capacity, no U.S. utility is prepared to take the open-ended financial risk of committing to a new nuclear plant.

In 1986, Lando Zech, the then chairman of the Nuclear Regulatory Commission (NRC), took the lead in correcting the system by initiating a new procedure calling for the safety analyses and NRC approval (certification) of standardized nuclear plant designs before plant construction begins. The licensing of GE's ABWR became the first trial case under the new procedure. (The NRC review of the System 80+ by ABB-Combustion Engineering and then the mid-size plants by Westinghouse and GE are to follow.) Now, after some four years of favorable technical reviews, the new design approval process is behind schedule in the NRC, and a recent court decision (under appeal) concludes that a key part of the related plant licensing procedure is invalid. Yet unless licensing stability is realized, no new nuclear power plants will be built in the United States, regardless of need.

Fortunately, there are some initiatives aimed at correcting our nuclear licensing situation. As noted, a program to pre-license standardized plant designs is underway. This is a program encouraged by the NRC and supported by the reactor vendors, EPRI, and the Department of Energy. In undergoing this new procedure, as the trial case, the ABWR licensing program has been bogged down by a number of policy issues within the NRC. We are working with the Commissioners and Staff to minimize the impact. We are hopeful that the ABWR will receive the first standardized plant certification in 1992, to be followed by the System 80+, and in the 1995 period the AP-600 and the SBWR. As part of the licensing process, we are working with the NRC to establish ground rules and regulatory procedures for licensing plants using certified designs. These involve inspections, tests, analyses and acceptance criteria conditions (ITAACS) to assure that the plant is built to the licensing specification. With the completion of the standardized plant certification process, plants in the U.S. should be constructed in the four to six-year time scale regularly achieved overseas, instead of the ten to fifteen-year periods and longer which have been characteristic here for the past two decades. However, my concern is that we have not yet had the new licensing system tested in the courts. I noted that there is already one adverse court decision, and undoubtedly any new reactor project—despite its need—will be attacked in the courts with the hope of derailing it. Thus, I believe that the licensing provisions of Title XII and Title XIII are vitally important in that they clarify Congressional intent and will remove grounds for extended litigation. Mr. Marc Rowden, who has extensive government and private sector experience in nuclear licensing, will discuss this matter in more detail.

Let me turn to Title XII of your proposed legislation, for the previous discussion leads right into it. The problem facing us in this country is our 18-year history of delays, escalating requirements and costs, and abandonments during the construction phase of a nuclear project. Whereas abroad nuclear projects are built on firm schedules with firm prices, no sane nuclear plant manufacturer or constructor would today make such an offer in the U.S., and with the past experience no utility is ready to undertake the risk. Thus, we need a means to demonstrate that with the new standardization licensing procedure, plants in the U.S. can be built efficiently in the four to six-year time frame that is achieved abroad. Your Title XII addresses this problem and, in particular, provides for Government "insurance" if new regulatory requirements are imposed after the issuance of a license. I am concerned, however, that the scope of Title XII, if narrowly interpreted, may be overly restrictive. The NPOC Board has recently developed and issued its strategic plan for building new nuclear energy plants. This strategic plan, which is strongly supported by both industry and DOE, contains several elements considered to be prerequisites for the next nuclear power plant order in the U.S. Thus, Title XII should clearly build on, and not replace, existing advanced reactor programs such as the DOE-industry evolutionary and small plant certification programs, consistent with the elements of the NPOC strategy. In addition, the elements of Section 12003(a) should be interpreted in a broad, non-exclusionary manner. It should be made clear that the prime requirements for DOE support are safety, cost effectiveness and—to avoid the licensing problems of the past—standardization.

It is gratifying to see that development of advanced concepts such as the ALMR and HTGR are specifically covered by the Advanced Technology Demonstration section of Title XII in the proposed legislation. As I have indicated, the advanced light

water reactor (ALWR) is clearly the technology to be used in the next few decades. It has received extensive development, has a well established 30-year industrial infrastructure and experience base, and is already developing the new designs based on this experience. However, the revival of nuclear energy in the U.S. and its widespread use throughout the world raises the issue of the long-term future of nuclear energy. The light water reactors (and other thermal reactor systems) rely on the economic availability of uranium. Although there appears to be sufficient economic uranium to supply ALWRs for some decades, the long-term promise of nuclear energy is an essentially unlimited energy supply through the Advanced Liquid Metal Reactor (ALMR). The ALMR is unique in that it can be made to manufacture (or breed) substantially more fissile material than it consumes. The utilization of this capability of modern ALMRs to breed may be essential sometime in the next century, as the growth in nuclear energy generation using advanced light water reactors, or other non-breeding reactors, consumes the currently abundant uranium supply.

The ALMR is also unique in that it has the potential capability of utilizing as fuel the long-life radioactive actinides that are the residual waste in spent fuels. While this capability does not change the need for a geological repository, it could change in a dramatic way the quantity, composition and period required for safe storage of nuclear waste, and the public perception of the waste situation.

The Advanced Technology Demonstration section would also cover development of other promising advanced concepts such as the High Temperature Gas Cooled Reactor, whose unique characteristics such as higher temperatures may provide for broader industrial applications of nuclear energy in the next century. Such industrial utilization would be dependent on future uranium availability but could be instrumental in taking a further step in responding to environmental challenges for reductions in the burning of fossil fuels.

I have covered a number of areas during this testimony. Let me summarize. I believe a U.S. national energy policy should recognize that the demand for electricity will likely continue to grow; that the world petroleum problems will continue over the long term; that dependence on foreign sources for that petroleum presents stark dangers as witness events in the Persian Gulf; and that because of the greenhouse effect and other environmental problems we may not be able to rely on fossil fuels as the predominant source of new energy supplies.

Nuclear power is being held back in the U.S., not by technical, but by institutional issues. Titles XII and XIII of S. 341 constructively address those institutional problems. The revival of nuclear power will depend upon need. For the past 17 years there has been no need. But when the American public recognizes that its welfare will depend upon the development of new, secure energy sources, and in particular, upon the revival of nuclear power; when it recognizes that world stability and the welfare of the world in general and of the underdeveloped nations in particular, depends upon new, non-polluting energy sources; then I believe that the American public will demand and will force a solution to the institutional problems.

Now, perhaps I have been too pessimistic. Perhaps the greenhouse effect will turn out to be less serious than projected; perhaps other environmental energy problems such as acid rain will be solved; perhaps we will find immense, new, acceptable energy supplies such as natural gas from the center of the earth; perhaps fusion, maybe even cold or spiral fusion, will be developed as practical power sources; or perhaps conservation together with solar and wind power will be able to economically provide for expanding world energy needs. Today, however, these potentialities taken together cannot be counted on as a solution to the nation's or the world's future energy supply problems. Under the circumstances, it would in my view be irresponsible if we do not take the institutional steps necessary to make the expanded use of nuclear energy a meaningful option for national and world welfare. Your proposed legislation addresses this issue and we support its enactment.

I appreciate the opportunity to testify before you on this vital subject and welcome the opportunity to respond to questions.

Senator FORD. Thank you very much, Mr. Wolfe. I was trying to follow your statement with the statement I have here, and you say that: "The two major supply alternatives for base load capacity now available are coal and nuclear energy." And you say: "However, with the growing concern about the greenhouse effect from burning fossil fuels, we may find ourselves in a situation where nuclear energy is the only practical means to satisfy expanded electrical use."

Are you telling me, with all the new technologies being put forth as it relates to fossil fuel, the burning of fossil fuels, that we are going to continue to have problems as it relates to greenhouse effect?

Dr. WOLFE. I think that is so. I think if one looks at the burning of fossil fuels, we are already today burning fossil fuel, so that there is a buildup of greenhouse, in particular carbon dioxide, in the atmosphere. So that in principle, if one wanted to stabilize the carbon dioxide or reduce it, one would in fact have to reduce our fossil energy use.

If one looks at the world requirements for energy in the future, which if one takes into account the underdeveloped nations and one looks very conservatively at doubling or tripling of world needs, it would be in my opinion essentially impossible to do this with fossil fuels if in fact the greenhouse effect was real.

Senator FORD. If in fact it is real, so therefore you are saying to me and to the committee that you may not think it is real?

Dr. WOLFE. No, I am saying that there are arguments on both sides, that in point of fact there are strong arguments that it is something to be concerned about. But I think that there are arguments from experts in the field—and I am not a meteorological expert—who would argue that the data is not in at the present time.

Senator FORD. You sound like a politician: Some of my friends are for it and some of my friends are against it, and I am for my friends.

Dr. WOLFE. Well, I do not like to make statements about technologies that I am really not expert on and qualified.

Senator FORD. Well, in your statement you talk about the ABWR that General Electric with its Japanese associates, Hitachi and Toshiba, have developed, this advanced boiling water reactor, and that you intend or appear to be starting in 1996 and 1997, respectively, these plants will provide needed power to Tokyo.

Has this been demonstrated? This is a new technology or an advanced technology, as I understand it. Did you have a demonstration project before you had gone to commercialization?

Dr. WOLFE. No. What we have had is some 10 years of requirement work, in which, at expenditures approaching $300 million to $400 million, we have checked all of the new features in the advanced boiling water reactor. So we have done tests on the natural circulation of it, we have done tests on the new control drives there. We have had flow tests.

We have tested all of the new features, and we believe that the technology is sufficiently tested and builds on past technology so that it makes sense to build that plant now on a commercial basis in Japan.

Senator FORD. For the record, do the Japanese have a regulatory commission to which you would make application for the construction of this plant?

Dr. WOLFE. That is right, they have a committee of MITI, M-I-T-I, a committee which is the equivalent, that part of it, to our Nuclear Regulatory Commission. Their nuclear reviews are of very, very high quality. I think they match ours, the Nuclear Regulatory

Commission. And as a matter of fact, they consult with our Nuclear Regulatory Commission.

Senator FORD. From the day the application was submitted for the construction of these plants, how long did it take you to get the approval to start construction?

Dr. WOLFE. We submitted our regulatory documents to MITI in 1988 and we expect that we will start construction, we will get the final review in the next couple of months.

Senator FORD. Now, when did you start? When did you submit your application?

Dr. WOLFE. 1988.

Senator FORD. 1988. But you have not been approved yet?

Dr. WOLFE. We will be approved within the next month or two, and expect to start.

Senator FORD. You expect to be approved?

Dr. WOLFE. Yes, yes.

Senator FORD. So it takes a couple years.

Dr. WOLFE. That is correct. This is the first one of the new style and it has taken, as I say, a couple of years.

Let me just contrast that. We also applied under the new standardization policy to the Nuclear Regulatory Commission. We started work with the NRC in 1986. My hope is that, now that some of the issues, in particular level of detail, have been resolved, that we have a chance maybe of getting the standardized license in 1992. But that is not certain. And I think that gives you some feeling of the difference between the regulatory systems.

Senator FORD. You say the Japanese consult with us before they make a decision.

Dr. WOLFE. Yes.

Senator FORD. Why is it 6 years for us and 2 years for them?

Dr. WOLFE. What they consult on are technical issues, and I do not think there is any question or real controversy about the technical issues that are involved here. The real problem is the system, the legal systems, the problems, the institutional problems. And they have a system that seems to work and we have one that, frankly, is bogged down.

Senator FORD. Mr. Wolfe, I have several more questions, but we have had several other Members arrive and I do not want to take up their time. If I do not have an opportunity to ask some of these questions that Senator Johnston would have asked you had he been here, I will submit those to you in writing and hope you will answer those and do it in an expedited manner.

Dr. WOLFE. You have my assurance I will, Mr. Ford.

Senator FORD. Thank you very much.

Senator Wallop.

Senator WALLOP. Thank you, Mr. Chairman.

I happen to agree with your assessment that there are skeptics on both sides of the global warming issue, but what seems pretty obvious is that, whether or not it exists, it is the right thing to do to reduce the level of hydrocarbons generated by the burning of fossil fuels. Would you agree with that much?

Dr. WOLFE. Well, I think there is something to the greenhouse effect and so I would, just as a personal non-expert, I would agree with you.

Senator WALLOP. Well, whether there is or not, it still seems the wise thing to do to lower the level of deposits.

Dr. WOLFE. I would not argue with that. But I would go one step further, Mr. Wallop, and say that I think nuclear power, if it is developed the way it should be developed, without the institutional constraints, will be a technology that on itself will compete very, very well with fossil plants, and so will in fact be able to meet world needs even with some questions on the greenhouse effect.

I do agree with you that it makes sense to reduce fossil fuel burning while we have this tremendous overhang of the greenhouse effect, the consequences of which are so large that one cannot really, I think, afford a risk that maybe it is not real. When we find out it is real, it is going to be very late.

Senator WALLOP. I was told a year ago in Japan that—and I am interested in your testimony—that they felt that the new reactor designs were probably going to be too small in their capacity for them, for two reasons. One is they are so limited in space that they do not have a lot of sites; and two is they have a political reaction not unlike ours and to they have to recycle that in each of the smaller plants was probably not worth it and approaching the kind of constraints that we find here.

But they have proceeded with this commercialization program.

Dr. WOLFE. Well, yes. Let me say that there are two plants, two types of plants that I described between the GE, Westinghouse, Combustion Engineering, or ABB plants. One is the GE advanced boiling water reactor and the System 80-Plus, Combustion Engineering, are large plants. Our advanced boiling water is a 1,350 megawatt electric plant, and that is the plant that the Japanese like.

They want large plants because they have very limited sites, and so they want to be able to use the sites to the maximum extent possible. For example, on the Kashuazaki site where we will be building this first two advanced boiling water reactors, they have a site which will have eight large, 1,000 to 1,300 megawatt plants.

The other two plants, the General Electric simplified boiling water reactor and the Westinghouse AP-600, are the small, 600-megawatt plants, and in this country it seems to me there may be use for both types of plants. And you will hear Mr. Farley later, whose company wants the small plants, and the small plants provide significant flexibility. It allows a company to, first of all, build small increments, and to build plants without forming a combine of companies, so it has control itself.

The large plant appears to be more economic than the small plants, so that on a cost per kilowatt-hour or mills per kilowatt-hour the large plant has advantages, and there are some utilities that want the large plant. So when I visit my utility friends, I have some who want the large and some who want the small, and I think it just depends upon the particular requirements of the utility.

Senator WALLOP. How does that or where does that lead us to with regards to the selection of standardized designs so that we can expedite this permitting process?

Dr. WOLFE. Well, I think all four of these plants—well, I know all four of these plants have submitted applications to the Nuclear

Regulatory Commission for standardized licenses. The advanced boiling water reactor is in the detailed regulatory review with the NRC, followed by the ABB System 80-Plus, which is a year or 2 years behind; and then the smaller plants are scheduled for the 1994-1995 period.

So all four of them will have standardized designs and will allow the utilities to meet their needs to make the choice between the small and the large, and I think we can go into more detail. There are arguments on both sides.

In addition, I think it does one other thing. It permits the competition, which I think is extremely helpful to this Nation and the way we operate. So the utilities are going to have opportunities to choose vendors and to choose different sized plants.

Senator WALLOP. Will all of these have the passive safety features which seem to be critical to restarting the public's acceptance?

Dr. WOLFE. I believe all of them have very improved safety features. I personally—let me give a personal comment here. I am concerned about the emphasis on "passive" systems. I think all of these systems have greatly improved safety, safety characteristics, but let me say all of them do depend, as I said earlier in my testimony, on non-passive features to put them in a passive state.

I think that the nuclear industry has to be absolutely clear when we talk about what we are striving for. I do not want to see us get into a position where we talk about passive safety and some opponent gets up and says: What are you talking about, passive safety? That valve is not a passive safety device.

So I think we have to be very careful how we do it, but all of them have improved safety and all of them have last ditch, what I would call, passive safety features, which I think protect the public very well.

Senator WALLOP. Ultimately, it is your view and I think your testimony that the provisions in Senator Johnston's and my bill lead us to the road of greater public acceptance and certainly greater utilization of nuclear power as part of the energy mix?

Dr. WOLFE. I believe that is so, Mr. Wallop. I think the bill attacks the problems. I do in my testimony, to hit your passive——

Senator WALLOP. You make a couple of comments.

Dr. WOLFE [continuing]. Make the comment that you should really, I think, emphasize safety and not necessarily passive safety, to avoid this future argument and, let me say, court-litigation, which affects our industry.

Senator WALLOP. I think that is wise counsel, because in our modern society, you give anybody half a chance to litigate and they will take three, not one-half.

Dr. WOLFE. Right.

Senator WALLOP. I appreciate your testimony. Thank you very much.

Dr. WOLFE. Thank you.

Senator FORD. Thank you, Senator.

Senator Bingaman.

Senator BINGAMAN. Thank you, Mr. Chairman.

Mr. Wolfe, let me ask more about this advanced liquid metal reactor that you referred to here.

Dr. WOLFE. Yes.

Senator BINGAMAN. You indicate here that it is going to substantially reduce the waste problem, and I think when we analyze the economics of using nuclear power one of the issues which is properly raised is what is the long-term cost of dealing with the waste and how does that impact on the cost of the power, not necessarily to the company but to the country.

I would be interested in any additional information you could give me as to the extent to which this does in fact reduce or obviate the problems that are generally related to the waste.

Dr. WOLFE. Yes, Mr. Bingaman. Let me start out by saying that in my opinion one of the major advantages of nuclear power is the fact that it produces very little waste and it is contained, as contrasted to other sources of power, which send the waste up the stack or in the case of a coal plant send 40 freight cars of waste out to be spread on the ground.

The wastes from the nuclear plant are small. They represent a freight car full of waste per year, and are contained. They are not just spread all over.

Now, the problem that does come up is, of course, that the wastes are radioactive and they stay radioactive for some thousands of years, so that one has to keep the wastes isolated. The proposed way of doing it in the Government program is to bury the wastes a half mile underground. The site that has been chosen is Yucca Flats to do that.

In my opinion and in the opinion of most people, most technical people who have examined it, disposing of the wastes in a geological formation that has remained stable for hundreds of thousands of years is a perfectly acceptable way to do it, and the cost of doing it is estimated at a tenth of a mill per kilowatt-hour. So it is very small in terms of actual cost.

The advantage, the potential advantage that the liquid metal reactor has, is that it can burn these wastes. It can take these wastes from the light water reactors and it can use them in the breeder reactor itself. And what it does is it converts the very high atomic number, the actinides, the heavy elements which are radioactive and have long lifetimes, it burns them up as it operates the reactor. So that in effect the wastes from the liquid metal reactor do not have these long-term radioactive materials.

So it changes the waste problem from a thousand-year—several-thousand-year problem, to a several hundred year problem. And in my opinion that could have great advantages in terms of just making the public feel better and knowing that I have a problem that in a few centuries is going to be taken care of.

Certainly no one, I think, can really worry about a salt deposit that has stayed, or a geological deposit that has stayed, stable for hundreds of thousands of years. No one is going to worry about a few hundred years, and in fact one can talk about just isolating them on the surface for a few hundred years.

So let me summarize by saying I think the waste problem, even the way we are going now, without the LMR, is manageable, is an advantage of nuclear power, is not a big economic burden, but that the liquid metal reactor has the advantage of reducing the problem

from thousands of years to hundreds of years, and I think that is more satisfying to the general public and helps the problem.

Senator BINGAMAN. Thank you very much for that explanation.

You also refer to the success you are having in Japan with regulatory procedures and all and generally the success the Japanese have had at using nuclear power, and I think that is well recognized.

Dr. WOLFE. Right.

Senator BINGAMAN. I read an article which was in the New York Times, I believe, a week or two ago, maybe three ago—I cannot remember—where they made reference or the writer of the article made reference to some incident that occurred in Japan just in the last few weeks that has created quite a stir about whether or not in fact their procedures and their safety provisions are in fact as invulnerable, as immune to error, as they had previously demonstrated or claimed.

Could you tell me about that incident?

Dr. WOLFE. Yes. They had on a pressurized water reactor, which has a heat exchanger known as a steam generator that separates the radioactive water that goes through the reactor core, it separates it from the rest of the system, and in fact in that heat exchanger or steam generator the hot water from the core boils water that has not been through the reactor and turns it into steam, which drives the turbine.

That heat exchanger developed a failure in one of the tubes, so that the radioactive water from the primary side went into the secondary side of that steam generator. That accident is one that is designed for in the development, in the plant design, and in fact the Japanese plant operated in accordance with the safety analysis.

The water went into the secondary side, the plant scrammed, it shut down, and the amount of release to the public, radioactive release, was some ten times less than that that was specified as normal release from the plant. So it effectively had no effect on the public.

I might, just to give you a flavor of the Japanese system. They really run their plants extremely well and have very high standards. So when something goes wrong in Japan, they take a very, very—it gets a lot of attention.

In this country I think we would, and I think there, too, they should, feel some pride that in fact the plant was designed to accommodate this kind of an accident and it did have no effect on the problem.

Senator BINGAMAN. Let me just ask one follow-up question. I think either in the same article or in a different article I also saw that, in spite of the success that the Japanese have had in using nuclear power and their safety record and all the rest, there seems to be a growing public concern in Japan about the use of nuclear power, which has not been there previously.

Have you been aware of this and, if so, could you tell me what the cause of it is?

Dr. WOLFE. Yes. Several years ago—in Japan they have a culture which is clearly different than our culture, and in general I would say in the past they have a cultural that, when they make decisions, it goes from the bottom, builds up, and they finally make a

decision at the top which is really already agreed to through most of the public.

So they have in the past had very little dissent. I think their country is changing. Modern communications are having effects on Japan. And several years ago they had a movement started which was an anti-nuclear movement. Incidentally, it was a woman's movement to a large extent, which in Japan is also a very different, new environment. So they do have opposition in Japan.

I think that the Japanese were somewhat, those in high positions, a little bit had a dilemma, never having faced this kind of opposition, which we of course have in this country all the time had some dilemma on it. My feeling is they are coming to grips with it, learning how to communicate with the people, and that in general the public is in favor of public power in Japan.

I might just point out that there was a very interesting election in Japan about 2 months ago. In Japan, in the northern part of the main island is where they are going to build their nuclear waste reprocessing plant and they have their nuclear waste burial grounds and they are going to have an enrichment plant. That whole area is going to be a nuclear area.

They had an election 2 months ago with four candidates, three of the four being against putting the nuclear plants there. The fourth candidate, who was in favor of that nuclear program, won, and I think that is an indication that in fact in Japan the public does support nuclear power.

Senator BINGAMAN. He was the LDP candidate?

Dr. WOLFE. That is right.

Senator BINGAMAN. That is all I had, Mr. Chairman.

Senator FORD. Thank you, Senator.

This is a very interesting witness, but we have one, two, three, four, five, possibly six more Senators to question Mr. Wolfe, and we have two additional panels and the administration's witness. So I am not trying to keep you from asking questions.

Senator WIRTH. Mr. Chairman.

Senator FORD. But I am not going to be around very much longer.

Senator Wirth, you are next.

Senator WIRTH. Mr. Chairman, I would just withhold questions, if others would agree to do that, so we can get the other three witnesses on and then maybe ask questions of the gentleman from GE and the three utilities. We might hold our questions for all of them together and that, it seems to me, would save everybody's time, if that would be agreeable to everybody.

Senator FORD. I have no objections to it. I cannot object.

Senator BURNS. I have never been more agreeable in my life.

Senator WIRTH. You look agreeable this morning, too.

Senator FORD. What about Frank? Are you all right?

Senator MURKOWSKI. Okay.

Senator FORD. Then that suits me fine. Mr. Wolfe, if you would join in at the end of the table there, and we will ask Mr. Farley, Dr. Kadak, and Dr. Buckman to come forward.

Mr. Farley is President and Chief Executive Officer of Southern Nuclear Operating Company. Dr. Kadak is president and chief ex-

ecutive officer of Yankee Atomic Energy Company. Dr. Buckman is president of Consumer Power Company in Michigan.

Gentlemen, we are delighted to see you this morning, and we want to get to you. Maybe this is going to be a very interesting panel. So Mr. Farley, if you will go first, make your statement. We will file it for the record or you can highlight it, whatever you wish to do.

STATEMENT OF JOSEPH M. FARLEY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, SOUTHERN NUCLEAR OPERATING CO., INC.

Mr. FARLEY. Thank you, Senator Ford. I will undertake to highlight.

Senator WIRTH. Mr. Farley, you have to talk right into that microphone. It is not a high tech mike.

Mr. FARLEY. Excuse me.

Senator FORD. It is not a smart mike, either.

Mr. FARLEY. I was hoping it might help in that regard.

Thank you for the opportunity to appear before this committee this morning to present the views of Southern Nuclear Operating Company on two important titles of the National Energy Security Act of 1991. We are greatly encouraged by the efforts of this committee as it examines the complex legislative and regulatory framework associated with the future of nuclear power.

At Southern Nuclear, we are dedicated to preserving the nuclear option and harnessing the enormous potential nuclear energy has for the ever-increasing electric energy needs of our country. I have been asked for testimony on both titles, title XII and title XIII, of the National Energy Security Act.

Before I give you specific comments, I would like to make two observations that are vitally important to us in the consideration of any legislation affecting the future of nuclear power. The first observation concerns the timing of the legislation. We believe that S. 341 is timed perfectly to avert troublesome disruptions in the planning of generation plants for the twenty-first century. This Congress is in a unique position to enact the necessary legislation to preserve the nuclear option, and if it fails to do so the damage for all will be difficult to reverse.

Virtually every electric energy forecasting technique points to the need for significant base load generation in our country beginning about the year 2000. Today utility generation planners are making decisions about the fuels they will choose to meet those energy requirements. Today the nuclear option is not being considered.

Instead, it is shunned and fossil fuels are receiving all the attention. The committee knows well the reasons why. Currently a new nuclear plant order faces uncertain construction requirements, a two-step licensing process that hinders the orderly issuance of authorization to operate, and uncertainty on low level waste storage, together with the other problems that flow from these.

Indeed, we believe that even if a utility decided to place an order for a new nuclear power plant, under the current regulatory instability financing such a construction effort may be impossible, since few if any investors may be willing to gamble on a legal framework

that has historically resulted in billions of dollars of disallowed investment.

Thus, the two goals of title XII and title XIII, reactor standardization and licensing reform, are timely and important ones, and certainly our confidence in the development of the future of American technology has been enhanced by the observations that we have all had of the success of American technology in the Persian Gulf.

My second prefatory point concerns the principles that should underlie any proposed legislation. They are regulatory stability and fairness. A stable regulatory environment, which includes a certified standard reactor design and licensing reform, must be the foundation of any legislation.

Fairness, too, must be embodied in it. The public must perceive that the legislation fairly results in a nuclear power plant that is safe to construct and operate, and the nuclear utility must perceive that no artificial unneeded constraints are allowed to hold its invested capital hostage after plant construction has been completed and any applicable acceptance criteria have been met.

Let me stress that the nuclear industry does not seek a guaranteed return of any investment in a new nuclear plant. We understand that under any circumstances any large construction project has inherent risks and uncertainties. These we cannot change.

What can be changed, and what will provide regulatory stability, is identification and early resolution of any siting, design, construction, and operating issues as are reasonably possible. Commercial standardization of a new nuclear power plant design would be a pivotal step in providing this much-needed regulatory stability.

In this regard, we believe that the Department of Energy should participate in programs that solve design certification, first of a kind engineering, and early siting problems. Continued research and development into advanced light water reactor design is also vitally important. We believe that any DOE resources channeled into these efforts will be most beneficial to our Nation's future goals, and in fact probably more so in our view than having DOE at this point actually participate in the actual construction of a new reactor.

To be sure, we are appreciative, though, of the goals of title XII, and for such technology as the high temperature gas-cooled reactor it will doubtless be necessary for that kind of participation. Selection of appropriate technology and construction of the next generation nuclear power plants by DOE is bold, innovative, and thought-provoking. Nonetheless, a measure of success has already been achieved through participation of DOE in various research and development programs.

For example, DOE's participation in our industry's advanced light water reactor program has resulted in very real progress on the technology for the new mid-sized passive plants or passively oriented plants. The efforts associated with DOE's light water reactor programs are beginning to show real promise, but much more work remains to be done and should be done, including participation in first of a kind engineering.

As a result, we believe that DOE's fiscal year budget request for $112 million for civilian nuclear activities, $62.5 million for light

water reactors, and $49.5 million for advanced reactor design and development should be approved by the Congress. Such a financial commitment to DOE's efforts will greatly contribute to commercial reactor standardization and will stimulate the development of new nuclear reactors.

While standardization of design is important to the resurgency of nuclear power, so too is a more streamlined licensing process. Though Southern Nuclear considers part 52, promulgated by the NRC, as a good start in establishing the regulatory process for design, certification, early siting, and a combined construction permit-operating license, we consider it just that, a good start, which points us toward a better ending.

Unquestionably, we share the same objectives about licensing reforms that appear in the current language of title XIII. These objectives are: early determination of the appropriate inspections, tests, analyses, and acceptance criteria which must be met during the construction process; authority to operate the plant if the acceptance criteria are met, notwithstanding a request for a hearing. Any preoperational hearing should be off the critical path and then held only if concrete and credible evidence is educed that an acceptance criterion has not been met.

Utilization of current NRC petition procedures to handle any significant new safety information. We do, however, believe that some fine-tuning of title XIII will clarify what Southern Nuclear believes is the true intention of the drafters of this title. Our preference is for an addition to section 185 of the Atomic Energy Act that would confirm that combined operating licenses will contain the necessary acceptance criteria to assure compliance with all aspects of the act. By linking the acceptance criteria to the findings required by the Atomic Energy Act in section 185, the NRC then can design inspections, tests, and analyses that will provide reasonable assurance that a plant can operate safely from a technical viewpoint, while at the same time fall within the framework of the Atomic Energy Act.

If the plant is constructed in accordance with the acceptance criteria, it can begin operations then without additional formality.

We prefer language making clear that emergency preparedness issues should be resolved at the initial hearing and that an amendment to a combined operating license will be handled just as an amendment to a current operating license. My testimony details more explicitly the exact language changes we would seek and the reasons for them.

Let me say again, however, that we share the goals of the drafters of title XIII and make these comments only in the interest of promoting statutory clarity.

I thank the committee again for allowing me to discuss these issues with you and look forward to providing the committee with any additional information or comments on these or any other parts of the National Energy Security Act. Thank you.

[The prepared statement of Mr. Farley follows:]

PREPARED STATEMENT OF JOSEPH M. FARLEY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, SOUTHERN NUCLEAR OPERATING CO., INC.

INTRODUCTION

My name is Joseph M. Farley and I am appearing before this Committee as President and Chief Executive Officer of Southern Nuclear Operating Company, Inc. As a wholly owned subsidiary of The Southern Company, Southern Nuclear provides technical and support services to the Southern electric system's three nuclear power plants. Prior to becoming President of Southern Nuclear, I was President of Alabama Power Company and served in that position for twenty years. I hold a Bachelor of Science degree in mechanical engineering from Princeton University and a law degree from Harvard Law School. I have been actively involved in the nuclear energy industry for many years. My involvement includes a two-year period of service as Chairman of the Institute of Nuclear Power Operations. In addition, I am currently Chairman of the American Nuclear Energy Council. In this capacity, I have been a member of the Nuclear Power Oversight Committee (NPOC), which is responsible to the industry for the coordination of all nuclear power industry association activities, and am very supportive of its strategic plan for creating a framework within which new nuclear power plants may be built. The executive summary of this strategic plan is attached hereto.

It is an honor to be given the opportunity to appear before this Committee. As a proponent of nuclear energy, I am greatly appreciative of the time and effort this Committee is spending discussing the future of nuclear power, the important role it can play in our nation's energy future, and the obstacles which may prevent its re-emergence. I am gratified to see this Committee's sincere desire to understand more fully what changes are needed to ensure that nuclear power is a viable and realistic option for addressing our country's ever-increasing need for electric energy.

PURPOSE

The purpose of my testimony is to provide this Committee with the perspective of an investor-owned utility on two major issues facing the nuclear power industry: reactor standardization and licensing reform. I will comment on the aspects of the National Energy Security Act of 1991 (S. 341) which address these issues. In so doing, I will offer encouragement to Congress to act now to amend the Atomic Energy Act and to base such amendments on principles of regulatory stability and fairness so that artificial, unneeded constraints on the future of nuclear power are eliminated. Only by being competitive with other fuel choices available for baseload generation in the 21st Century will nuclear power be considered a realistic possibility for future electric energy needs. Preservation of the nuclear power option is very important to investor-owned utilities—as it is to the United States—because of its utilization of American technology and ingenuity and because of the safety, security and reliability that this technology has produced over the past thirty years.

Another purpose of my testimony is to acknowledge the benefits that have been realized from the Department of Energy's participation in reactor design standardization and siting of advanced reactors, and to encourage continuation of this participation. It is sound public policy that the various disciplines of engineering and sciences associated with the next generation of nuclear reactors are being encouraged and developed by the active pursuit of research and development programs sponsored by the Department of Energy. All of our citizens will benefit from the consensus science that emerges from advanced reactor research and development, first-of-a-kind engineering and consideration of plant siting issues. Such an effort promotes the development of advanced technology, maintains the American competitive edge, and creates a potential to reap rich rewards for our citizens in the future.

Before addressing the specifics of Titles XII and XIII of S. 341, two prefatory observations should be made: the first addresses the timing of any proposed legislation, and the second identifies the principles upon which such legislation should be based.

THE TIME HAS COME FOR LEGISLATION

No longer is the question of the future of nuclear power an abstract one; the debate period has been fruitful and positive, but action is now required. In the past, some have declared that fission plants should be abandoned, claiming that nuclear power is unsafe. This claim has proven to be false; consensus science and public opinion are to the contrary. Throughout the halls of Congress, the corridors of industry, and in universities, laboratories, town halls, and in the homes of many

Americans, past fears and superstitions about nuclear power are steadily giving way to the advancement of scientific fact, prudent engineering, technological achievement and safe nuclear power plant operating records. Every day more Americans realize what nuclear power plant operators have always known: nuclear power is safe, nuclear power is economical, and nuclear power is environmentally advantageous.

Legislation is needed now because utility planners are presently making decisions about their generation mix for the year 2000. A typical lead time for a baseload coal plant is 6-8 years to complete the requisite environmental studies, receive necessary permits, negotiate fuel procurement contracts and construct the plant. It is projected that a mid-sized, passive reactor will require a similar planning horizon once an appropriate licensing process is established. Without Congressional action now, no consideration will be given to nuclear power as a resource available to meet our nation's projected baseload generation needs, which are a mere nine years away. This means that an opportunity for fuel diversity, an important concept in least-cost generation planning, will be lost.

For The Southern Company, the need to preserve the nuclear option is very real. Our 1991 integrated resource plan projects an initial requirement for 800 megawatts (MW) of baseload generation soon after the turn of the century, with other additions to follow in succeeding years. This baseload generation is comparable with the amount of electricity used each month by 500,000 homes. The Southern Company's projected need is based on a conservative annual growth rate in this decade of 2.6%. In 1990, as shown by my Exhibit 1, The Southern Company had 5,400 MW, or 15%, of its generation capacity in nuclear power facilities. However, 36,500 gigawatt hours (GWH), or 23% of its energy mix, came from the three nuclear plants. (Exhibit 2). By contrast, only 7% of the generation capacity was fueled by oil and gas and it accounted for only 1% of the system's energy. By 2002, we project that 24.3% of The Southern Company's generation capacity will be fueled by oil and gas, principally for intermediate and peak load purposes. (Exhibit 3). Nonetheless, this increased demand for these fuels will exist at a time when some other utility systems, if denied the nuclear option, will be forced to consider oil and gas for baseload generation purposes. Such increased demand will undoubtedly have the effect of increasing our nation's dependence on oil and gas, which is not in our collective long-term best interest. I should add here that these projections include the effect of active demand-side options such as interruptible service contracts or tariffs with certain customers and utilization of stand-by generation capabilities of various commercial and industrial customers, as well as affirmative support for conservation measures.

The facts are clear. If no legislative action is taken and the nuclear option is surrendered to the French, Japanese and other countries, The Southern Company, like many other investor-owned utilities, will be limited to choosing either coal or oil and gas for the vast majority of its future generation needs. While natural gas may have an important role to play in units constructed to meet intermediate and peak load projections, current economic forecasts do not favor this fuel for baseload generation for our system. From our perspective, reliance solely on coal as the only fuel available for baseload generation is poor planning, shortsighted and will inevitably lead to troublesome times in the supply of electric power to our customers.

One additional point should be made as providing an incentive for Congress to act now. In November, 1990, in *NIRS* v. *NRC*, 918 F.2d 189 (D.C. Cir. 1990), the District of Columbia Circuit Court of Appeals ruled that the Atomic Energy Act requires a pre-operational hearing of potentially broad scope before a full power operating license can be granted. This Committee can be assured that, from the perspective of an investor-owned utility, no new nuclear power plant order will be placed as long as the current licensing procedures exist. As Sherwood H. Smith, Jr., Chairman, President and Chief Executive Officer of Carolina Power and Light Company, observed in his testimony last year before the Senate Subcommittee on Nuclear Regulation, the possibility for a pre-operational hearing, on the critical path, of indefinite duration is a tremendous deterrent to any utility considering ordering an advanced reactor. Past experience vividly demonstrates that pre-operational hearings can be used for the purpose of delaying plant operations, thereby holding hostage billions of dollars of invested capital, rather than for insuring conformance with the license or the requirements of the Atomic Energy Act. Because this recent court decision suggests strongly that an adversarial, pre-operational hearing of potentially broad scope may remain on the critical path of any new nuclear plant, legislation is necessary now to achieve the proper balance in the licensing process. Only then will America have the potential to declare its independence from dependence on fossil fuel as a sole source for future baseload generation.

LEGISLATION PRINCIPLES

Any constructive comments about S. 341, specifically Titles XII and XIII, should begin by articulating the principles that should underlie such legislation. This Committee is knowledgeable and well-versed in the problems created by a two-step licensing process and the absence of certified, standardized reactor designs. These problems have contributed to vast construction cost overruns and the subsequent disallowance for ratemaking purposes of billions of dollars of investment. The National Energy Security Act of 1991 bears witness to the appreciation of its drafters to the abysmal economic results of some prior licensing efforts and clearly represents a genuine desire to correct these historical shortcomings. Thus, what will be stressed here are two guiding principles upon which any new nuclear power legislation must be based and Southern Nuclear's perception of how best to articulate clearly these principles in any legislation.

Regulatory stability and fairness are the bedrock of the future of nuclear power. Without them, neither the investor, whose capital must be attracted back to the industry, nor the public, who must believe that the proposed plant design is safe, economical and that plant operations will not endanger health and safety, will support a new nuclear plant construction project. A certified, standardized design for a family of nuclear power plants, in itself, will promote stability by confirming the scope of the construction effort and the necessary economic commitment to support it. Fairness in the licensing process is important for the opportunity it presents to resolve safety issues in an open forum and accord any decision its proper finality. Both the certified, standardized design and a fair licensing process are needed to satisfy future utility investors that their capital will not be lost or diminished in value and to satisfy the public that the plant is safe to operate.

A principal component of any decision to commit to the major capital expenditure required for baseload generation is a concern over whether the investor will receive a fair rate of return on the invested capital. Many utility investors are portfolio managers, IRAs, retirement plans and similar capital sources whose managers weigh carefully the risk/reward components of every investment decision. When they loan money to the future, which is what they do by purchasing securities issued to fund construction of a new nuclear plant, a key element affecting the return on capital they require will be an evaluation of the investment risk. If instability and uncertainty are associated with the construction project and its licensing, then the investor perceives more risk and requires a concomitant higher interest rate. The converse is also true; more stability equals less uncertainty, a reduced risk and, accordingly, savings of millions of dollars in interest costs which need not be borne by a utility's ratepayers.

Given the current regulatory instability and unfairness, even if a utility were willing to accept the risk of ordering a new nuclear plant, investors may very well be unwilling to accept the risk associated with financing the effort. For now, the opportunity to order a new nuclear power plant is in a self-sustaining failure mode: the prohibitive risk of uncertain construction requirements begets a prohibitive financial risk to the investor, paralyzing the nuclear option and forcing reliance solely on fossil fuels.

It is poor public policy indeed to tolerate a statutory framework that produces such stagnation. No one gains when uncertainty, instability and delay prevail. All of us suffer loss in one form or another. By insuring a stable, fair and predictable reactor design and licensing environment, Congress will promote an objective that benefits all Americans—from those who receive the energy from the generation unit, to those whose pension funds and retirement income are free from any artificial and unneeded investment risk. Promotion of regulatory stability must be a guiding light in any legislative effort.

Of equal concern is public perception of fairness. For a utility to recover fully its cost of service associated with its obligation to serve its customers, the public, acting through their state regulators, must believe that the process of determining the amount of investment, and its recovery, comport with traditional American notions of fair play and even-handedness. In nuclear power, this means that the public should have a significant opportunity, early in the licensing process when its participation can be meaningful and constructive, to satisfy itself that health and safety are not being compromised and that the construction budget of the utility is a realistic one. Fairness also means that once the necessary decisions are made to establish the licensing basis for a new plant, they should be respected, accorded the weight of other regulatory decisions, and not subjected again to an adversarial hearing process. Issues concerning construction, emergency planning and operation of

the plant, once resolved, should not be re-opened absent compelling, concrete evidence of safety significance.

Both of these principles have been recognized in various ways in S. 341. We are gratified by this recognition because the first step to problem solution is problem identification and appreciation. This part of the equation has already occurred. There are, however, areas of improvement; areas where constructive comments are appropriate which, if implemented, would provide the necessary framework for an investor-owned utility to place an order for a new nuclear reactor.

COMMENTS ON TITLE XII—ADVANCED NUCLEAR REACTOR COMMERCIALIZATION

A new nuclear power plant, which uses a standardized, pre-approved design, will help provide investment protection for future plant owners and hence contribute significantly to a stable regulatory process. Early resolution of significant regulatory issues, such as safety determinations about reactor design, emergency preparedness, and identification of the appropriate inspections, tests, analyses and acceptance criteria, which are necessary to satisfy the NRC that the plant can be constructed and operated in accordance with the Atomic Energy Act, are of paramount importance to the investor-owned community. If there is to be an active place for nuclear energy in meeting the U.S. energy requirements for the future, then design standardization and certification must become a high priority issue within Congress, the Department of Energy and the Nuclear Regulatory Commission.

To promote this worthwhile goal, Congress should continue to encourage strongly the participation of the Department of Energy in programs which solve first-of-a-kind engineering and early site certification problems. Southern Nuclear believes that this participation will be more beneficial to the future of nuclear power than an opportunity for DOE to participate in the actual construction of a new reactor. Indeed, we fear that possible DOE participation in actual construction of a new nuclear plant may displace funds available to support research and development programs focused on establishing a standardized light water reactor design. Diverting funds from this important design objective may hinder the common goal that the NRC expeditiously complete design certification of an ALWR so a new order can be placed by the mid-1990s.

This goal is attainable. U.S. utilities have for several years been leading an industry-wide effort to establish a technical foundation for the design of the next generation of light water reactors. This effort has been managed by the Electric Power Research Institute (EPRI) and has been closely coordinated with and supported by the Department of Energy's Light Water Reactor (LWR) Program. Recently, the Nuclear Power Oversight Committee issued its strategic plan for building new nuclear power plants which specifies NRC design certification as a major building block.

At Southern Nuclear, we believe that the passive LWR technology will be the dominant nuclear energy technology for the next increment of nuclear capacity ordered in the United States. Accordingly, we recommend that Congress increase its support for DOE's participation in programs that will advance the timetable for certification of this technology. Need for this support is particularly compelling since the NRC has issued guidance to its Staff approving a graded approach to the level of detail required for design certification under 10 C.F.R. Part 52, which it did on February 15, 1991. We at Southern Nuclear agree with this approach and are encouraged that by continuing to coordinate their efforts, the nuclear industry and DOE can proceed expeditiously towards certifying a standard advanced light water reactor design.

Southern Nuclear is principally interested in the mid-sized, passive advanced light water reactor because we believe it will lead to simplified engineering designs, lower construction costs, and improved power plant operations and maintenance. Because the ALWR design features passive safety systems, which minimize the need for an operator to intervene in the event of an accident or equipment breakdown, and because it utilizes gravity and certain physical properties of materials to remove heat automatically from the reactor core in an emergency, Southern Nuclear believes that it is more likely to receive broad-based public acceptance. Of course, an ALWR requires a lesser financial commitment and offers more potential to match incremental supply with growth in demand, since a 600 MW plant is much easier for us to fit into a load growth curve than is a 1300 MW plant. Naturally, we are aware that other utilities prefer the larger, evolutionary reactors for load growth, siting considerations and other understandable reasons. While the passive ALWR fits best in our generation plan, we are nonetheless supportive of the evolutionary design technology.

Continued participation by DOE in the design certification process is crucial to its successful completion. Already this participation has produced innovative modular construction techniques, a better understanding of the requirements associated with first-of-a-kind engineering and associated non-recurring design parameters, and appreciation of generic siting issues. Among other things, this participation helps identify the additional design and confirmatory testing required to produce the construction drawings, equipment specifications, operational procedures, and final cost and schedule estimates necessary to permit start of construction.

Accordingly, we support DOE's FY-1992 budget request, in which the DOE Nuclear Energy Office has requested a total of $112 million for civilian nuclear activities, $62.5 million for LWR's and $49.5 million for advanced reactor R&D. We support a commitment by Congress to fund DOE's continued support of design certification until timely completion and participation in first-of-a-kind engineering. In the past, DOE has participated in research efforts for clean coal technology, solar and wind power and other renewable sources of energy. The Southern Company has participated in much of this research. Nuclear power's current contribution to our nation's electric energy requirement and bright promise for the future is no less deserving of substantial R&D support. To us, nuclear power's record of success justifies the full $112 million for the specific programs requested by DOE. Because we believe that the development and commercialization of an advanced LWR will more likely occur if Congress supports its full R&D funding, then we recommend that any appropriation for Title XII's requirement that the Secretary of Energy select a technology and pursue a possible construction program be in addition to DOE's requested $112 million. From our perspective, DOE's passive LWR research and development participation makes an important contribution to commercial reactor standardization and Congress should increase its financial support for this worthwhile effort. Once commercial reactor standardization occurs, the competitive market is the best place to determine which manufacturer receives the first order.

COMMENTS ON TITLE XIII—NUCLEAR REACTOR LICENSING

With design certification of a passive ALWR as a building block, a parallel step in preserving the nuclear option is licensing reform, the clear objective of Title XIII. Southern Nuclear is pleased that the NRC promulgated its Part 52 rule to establish the regulatory process for design certification, early siting, and a combined construction permit/operating license. However, more work remains to be done. In order to assure regulatory stability and provide a fair opportunity for all interested parties to air their concerns about a proposed plant, Southern Nuclear supports a full adjudicatory hearing prior to issuance of a combined license. The purpose of that hearing should be to address and resolve design, siting, and emergency preparedness issues, together with establishing the inspections, tests, analyses and acceptance criteria necessary to comply with the Atomic Energy Act.

Our review of Title XIII convinces us that we share the same objectives embodied in it but, because we believe there is potential for confusion in interpreting this Title, we recommend some clarifying language changes. For example, under Title XIII, it is unclear whether an additional operating license is required once a plant has received its combined operating license and construction is complete. We believe that the matter should be clarified to confirm that no additional hearing or license is necessary to operate the plant if all of the acceptance criteria have been met.

Another concern is the relationship between the requirement of Section 185, which mandates a "finding" that the plant will operate in conformity with the Act, and the "finding" described in Title XIII, which requires the NRC to find conformance with the combined license. Does this new finding substitute for the one under Section 185, or is that, too, still a requirement? The legislation simply does not answer the question clearly, although we believe the drafters do not feel that a Section 185 finding would be necessary. With some minor language changes, the legislation can make it absolutely clear that the combined license process does displace the finding described in Section 185 and the additional hearing requirement that this finding may trigger.

Our preference is for legislation that amends Section 185 of the Atomic Energy Act by adding a section pertaining to combined operating licenses. Such an amendment would articulate that a combined operating license will contain the necessary acceptance criteria to assure compliance with all aspects of the Atomic Energy Act, including the requirements of Section 103 and the current Section 185. We believe that by linking the acceptance criteria to the findings required by the Atomic Energy Act, the NRC can then design inspections, tests, and analyses which will provide reasonable assurance that the plant can operate safely both as a technical

matter and within the legal framework of the Atomic Energy Act. Then, our recommended legislation would specify that satisfaction of the acceptance criteria and subsequent receipt of an authorization to operate under Section 185 would not be another grant of a "license" requiring a second adjudicatory hearing under Section 189a.

Importantly, we do not ask Congress to deny hearing opportunities for any significant new safety information, nor do we ask it to eliminate altogether the possibility of a pre-operational hearing. Significant new safety information developed during the construction of a new nuclear power plant can be raised through current NRC procedures by filing a petition to modify, suspend or revoke the combined operating license. This is the identical process that would now be followed if significant new safety information is discovered that challenges the licensing basis of an existing plant. It is not logical that a process deemed acceptable for currently operating plants should be cast aside for those constructed pursuant to a combined operating license. After all, a combined operating license and its acceptance criteria will already have been subjected to rigorous examination in a full adjudicatory process prior to its issuance.

Another possibility for a hearing is a challenge by an interested person to the propriety of an NRC finding that the plant has met a particular acceptance criterion. Again, our comments should be interpreted as reinforcing objectives that we believe we share with the drafters of Title XIII. We believe that a hearing should be held on such a challenge only if the complaining party makes out a *prima facie* case, by substantial, credible evidence, that an acceptance criterion has not been met, that such a failure seriously compromises public health and safety, and that any purported deficiency cannot be resolved without a hearing. Because such a showing would in essence be a challenge to the results of a prior NRC determination reached through the process of inspections, tests and analysis, the challenger should bear the full burden of proof on the issue. Of course, since the utility had already complied with the mandated inspections, tests and analysis, then its investment should not be held hostage by placing such a hearing on the critical path. The plant should be authorized to operate notwithstanding a hearing request. The NRC should have the flexibility to determine whether such a hearing should be adjudicatory or non-adjudicatory, depending on the issue raised and the desire of other interested parties to present testimony and to examine or cross-examine witnesses. Of course, if it is proven that an acceptance criterion has not been met, then the NRC can fashion an appropriate remedy.

Finally, another way of insuring stability and fairness in the process is to provide for amendments to the combined operating license in the same manner available for currently issued operating licenses. An amendment involving no significant hazards consideration should be made immediately effective notwithstanding a request for hearing. An amendment involving a significant hazards consideration can be the subject of hearings in the same manner as the initial combined operating license.

Because our comments regarding proposed changes to Title XIII rely, wherever possible, on existing licensing procedures associated with operating licenses for the nation's 112 commercial nuclear power reactors, then we believe there will be wide acceptance in both the public and the nuclear industry of this process. It fairly balances the interest of the public by insuring that the acceptance criteria relate directly to the findings mandated by the Atomic Energy Act, while simultaneously assuring a utility, its investors and state regulatory commission that, if the acceptance criteria are satisfied, no artificial, procedural delay tactics can prevent operations. Instead, operation of the plant can proceed on schedule.

CONCLUSION

This concludes my testimony. Again, let me say that it is an honor for me to have this opportunity to present testimony to this Committee. We at Southern Nuclear remain vitally interested in the legislative process and look forward to a bill that will protect our nation's electric energy future by promoting reactor standardization and licensing reform.

THE SOUTHERN COMPANY
GENERATION CAPACITY - 1990

Nuclear

5400MW 15%

Coal

24000MW 67%

Hydro

4100MW 11%

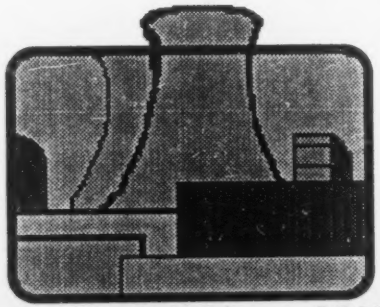
Gas/Oil

2600MW 7%

Exhibit 1

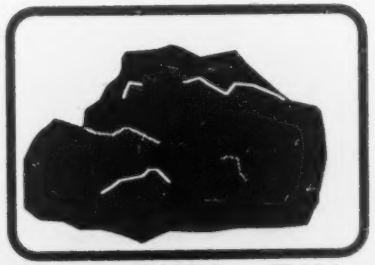
THE SOUTHERN COMPANY
GENERATION ENERGY MIX - 1990

Nuclear



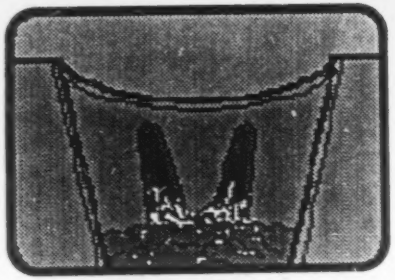
36500GWH 23%

Coal



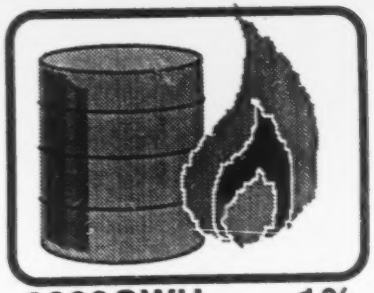
114000GWH 71%

Hydro



8000GWH 5%

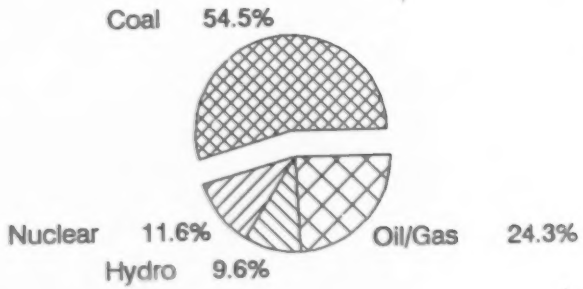
Gas/Oil



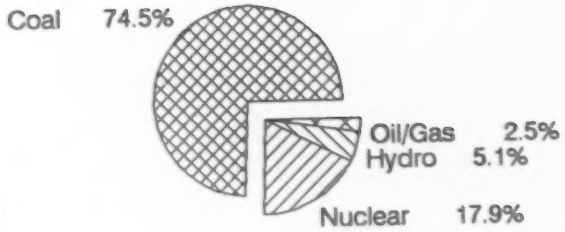
2000GWH 1%

Exhibit 2

Capacity and Energy Distribution in 2002



Capacity



Energy

Exhibit 3

STRATEGIC PLAN
FOR BUILDING
NEW NUCLEAR POWER PLANTS

NUCLEAR POWER
OVERSIGHT COMMITTEE

November 1990

NUCLEAR POWER OVERSIGHT COMMITTEE

Sherwood H. Smith, Jr., Chairman
Chairman, President and CEO, Carolina Power & Light Company

J. Phillip Bayne
President and COO, New York Power Authority
Representing American Public Power Association
Chairman, Ad Hoc Committee for NPOC's Strategic Plan

Shelby T. Brewer
President, ABB-Combustion Engineering Nuclear Power

Joseph M. Farley
Executive Vice President, Nuclear, The Southern Company
Chairman of the Board, American Nuclear Energy Council

J. S. Farrington
Chairman and CEO, Texas Utilities Company
Chairman of the Board, U.S. Council for Energy Awareness

E. James Ferland
President, CEO, and Chairman of the Board, Public Service Electric & Gas Company
Chairman of the Board, Electric Power Research Institute

William S. Lee
Chairman and CEO, Duke Power Company

Walter J. McCarthy, Jr.
Past Chairman and CEO, The Detroit Edison Company
Chairman of the Board, Institute of Nuclear Power Operations

Eugene R. McGrath
Chairman and CEO, Consolidated Edison Company of New York
Chairman of the Board, Nuclear Management and Resources Council

James J. O'Connor, Jr.
Chairman and CEO, Commonwealth Edison Company
Representing Edison Electric Institute

Joseph F. Paquette, Jr.
Chairman and CEO, Philadelphia Electric Company

F. F. (Bud) Stacey, Jr.
President and CEO, Oglethorpe Power Corporation
Representing National Rural Electric Cooperative Association

Bertram Wolfe
Vice President and General Manager, GE Nuclear Energy

John B. Yasinsky
Executive Vice President, Power Systems, Westinghouse Electric Corporation

Adrian Zaccaria
President, Bechtel Power Corporation

MESSAGE FROM THE CHAIRMAN

The United States faces two serious energy problems. The first involves this country's dangerous, growing dependence on imported oil, which now represents more than half of U.S. oil consumption. The second is ensuring the adequate, reliable, affordable supplies of electricity over the long term as needed to sustain U.S. economic growth and a rising standard of living for all Americans.

These two problems are closely related. Between 1973 and 1989, virtually all new electric supply came from coal-fired and nuclear energy plants. These plants made possible a dramatic reduction in the amount of oil burned for electricity production. Today, however, only a handful of new coal and nuclear plants are still being built--far fewer than needed to meet projected growth in electricity demand. Many electric utilities are reluctant to consider ordering new nuclear plants because of the many regulatory and financial uncertainties and risks they have experienced over the last 10 to 15 years. As a result, some utilities are turning to existing oil-fired plants and using more imported oil.

Given America's need for adequate electricity, energy security and a clean environment, we must reverse this trend and renew our commitment to secure, plentiful, domestic sources of electricity like nuclear energy.

A Position Paper prepared by the Nuclear Power Oversight Committee* reviews the benefits of nuclear energy (including its role in displacing imported oil and protecting our environment), discusses the negative consequences of not building new nuclear plants, and reviews the obstacles that stand in the way of new nuclear plant orders.

Providing the new electric supply that will be needed in the 1990s is a complex undertaking. It will require the balancing of many risks, many uncertainties and many competing interests. No single fuel can satisfy all circumstances. Fuel diversity is one of the great strengths of the U.S. electric supply system, and nuclear energy has a key role to play.

The electric utility industry wants to include nuclear energy in its planning for new capacity. Specifically, the industry has set a goal of ordering and building new nuclear plants within the next several years; so that they may be on-line by the end of the decade or soon thereafter.

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* A Perfect Match: Nuclear Energy and The National Energy Strategy, Nuclear Power Oversight Committee, November 1990. This is an update of an earlier NPOC Position Paper, Nuclear Energy For the Future: What We Must Do, published in January 1989.

Many questions must be answered and many issues resolved before electric utilities will be able to order new nuclear capacity. This Strategic Plan, developed by an Ad Hoc Committee created by the Nuclear Power Oversight Committee, creates a framework within which new nuclear plants may be built.

This plan is an expression of the nuclear energy industry's serious intent to create the necessary conditions for new nuclear plant construction and operation. The industry has assembled a comprehensive, integrated list of all the actions that must be taken before new plants will be built. Perhaps more important, it assigns responsibility for managing the various issues, and sets timetables and milestones against which we can measure progress.

All elements of our society--government, industry, academia, environmental groups, political organizations and others--must work together to ensure the United States increases its reliance on secure, domestic fuel sources. Nuclear energy gives America the power of independence. Working together, we can ensure a major role for nuclear energy in this country's energy strategy, and a bright future for America in the years to come. With this Strategic Plan, the nuclear energy industry makes an earnest commitment to do its part.

Sherwood H. Smith, Jr.

Chairman
Nuclear Power Oversight Committee
and
Chairman, President, and Chief Executive Officer
Carolina Power and Light Company

STRATEGIC PLAN FOR BUILDING NEW NUCLEAR POWER PLANTS

SECTION I: EXECUTIVE SUMMARY

THE NEED FOR A PLAN

The Nuclear Power Oversight Committee (NPOC) has developed a Strategic Plan with the goal of being able to order new nuclear power plants by the mid-1990s, which could be built and operating to meet electricity demand by the turn of the century. Section II of this report presents an outline of the plan. Section III provides detailed action plans. The Strategic Plan, when successfully executed, provides an institutional framework within which future advanced nuclear plants could be built with confidence.

NPOC has developed this plan because it is convinced that the United States will need additional nuclear power plants in the 1990s and beyond. There is increased urgency to meet this need because:

- The projected shortfall in baseload electric generation capacity in the mid-1990s is becoming more certain.
- New requirements for air pollution controls on coal plants, such as those identified in the new amendments to the Clean Air Act, will increase the cost and regulatory uncertainty of electricity generation from coal.
- Although today's operating nuclear plants have greatly reduced the use of imported oil in electricity generation, imported oil usage is growing again in the electric sector. New nuclear plants are needed to reverse this unfortunate trend.
- Increased concern about the possible long-term effects of greenhouse gas emissions calls for greater priority in developing and utilizing electric generation processes that do not produce greenhouse gases.

In its recent Position Paper*, an update of an earlier NPOC Position Paper**, NPOC substantiates these reasons for urgency as well as the important benefits and outstanding record of today's 112 U.S. nuclear plants. The paper also

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* A Perfect Match: Nuclear Energy and the National Energy Strategy, November 1990, published by U.S. Council for Energy Awareness, 1776 I Street NW, Suite 400, Washington, DC 20006

** Nuclear Energy for the Future--What we Must Do, January 1989.

summarizes the industry's major effort to improve the operations of present plants, and identifies the programs underway to design even safer, more reliable, and more economic standardized nuclear plants for the future. The extensive operating experience with today's light water reactors (LWRs), and the promise shown in recent technical developments, leads the industry to the conclusion that the next nuclear plants ordered in the United States will be advanced light water reactors (ALWRs). Two types are under development: units of large output (1300 MWe) called "evolutionary" ALWRs and units of mid-size output (600 MWe) called "passive" ALWRs. (The term "passive" describes the emergency cooling features, which depend more on natural processes such as gravity than on powered equipment such as pumps.) Both approaches rely on proven technology. In addition to the technical design issues, federal and state regulatory uncertainties must be reduced so that the financial risks of nuclear plant construction and operation are reasonable.

Significant progress toward resolving the issues identified in this plan is needed before firm commitments to order more nuclear plants can be expected. It takes many years to license and build the nuclear power plants that will contribute to the needed electric generation capacity in the future. That is why it is important to start planning now.

This Strategic Plan, then, outlines an integrated effort to address the range of institutional and technical issues on which significant progress must be achieved to make nuclear power attractive for the 1990s.

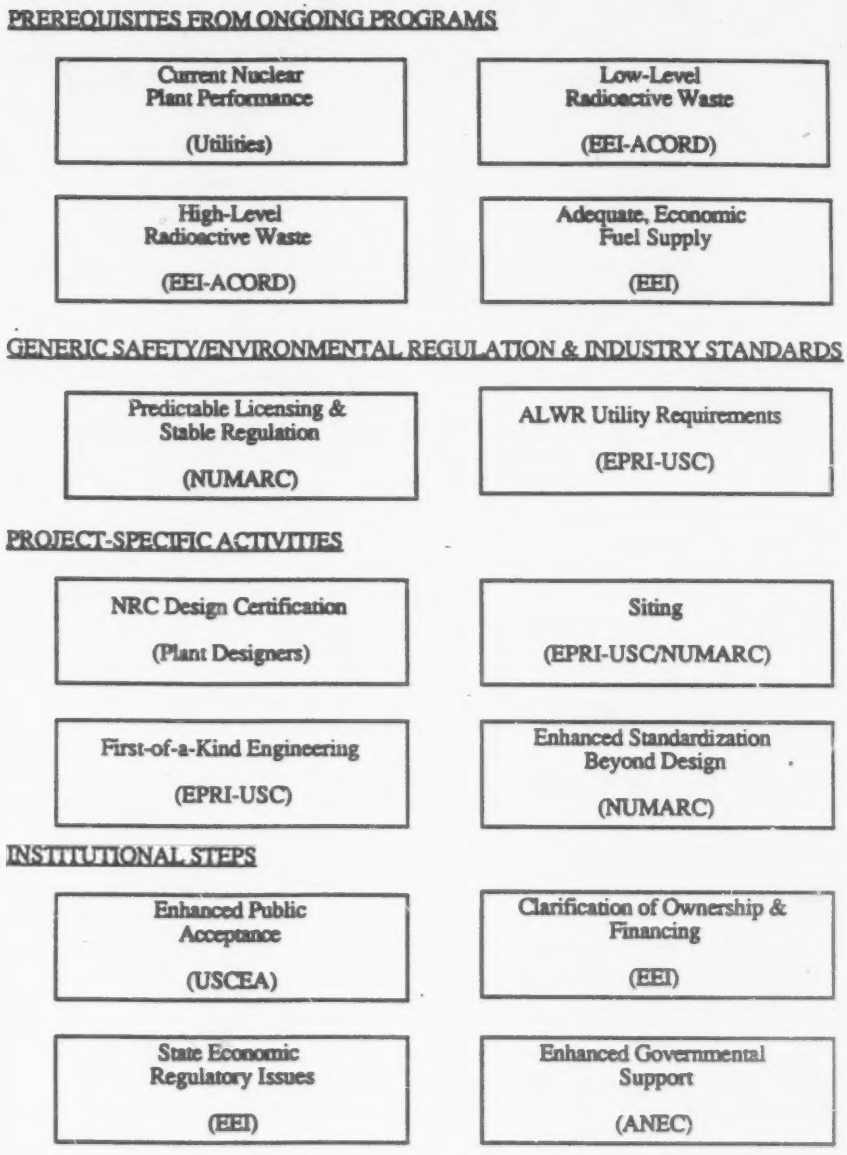
THE CONTENT OF THE PLAN

The plan:

- identifies all the significant enabling conditions (technical/industrial, regulatory, environmental, financial, legislative/legal, organizational, political, and public acceptance) which must be met to achieve the goal;
- assigns lead and supporting responsibilities to the appropriate existing organizations or standing committees in the industry to detail and implement an action plan for achieving each condition;
- fosters joint and coordinated efforts between government and industry which would enhance implementation of the strategies and provide for sharing resource requirements.

Fourteen enabling conditions, or "building blocks," have been defined, each of which uniquely contributes to the complete structure. The "building blocks" are outlined in Figure I-1, which shows the title and lead industry responsibilities, and are grouped into four categories:

Figure I-1: BUILDING BLOCK SUMMARY


PREREQUISITES FROM ONGOING PROGRAMS
Current Nuclear Plant Performance (Utilities)
Low-Level Radioactive Waste (EEI-ACORD)
High-Level Radioactive Waste (EEI-ACORD)
Adequate, Economic Fuel Supply (EEI)
GENERIC SAFETY/ENVIRONMENTAL REGULATION & INDUSTRY STANDARDS
Predictable Licensing & Stable Regulation (NUMARC)
ALWR Utility Requirements (EPRI-USC)
PROJECT-SPECIFIC ACTIVITIES
NRC Design Certification (Plant Designers)
Siting (EPRI-USC/NUMARC)
First-of-a-Kind Engineering (EPRI-USC)
Enhanced Standardization Beyond Design (NUMARC)
INSTITUTIONAL STEPS
Enhanced Public Acceptance (USCEA)
Clarification of Ownership & Financing (EEI)
State Economic Regulatory Issues (EEI)
Enhanced Governmental Support (ANEC)

A. Prerequisites From Ongoing Programs

There is a need to increase confidence in nuclear power through improved performance. That need is being addressed in ongoing programs, but progress in those programs must be monitored and coordinated since they influence the prospects for success of the overall plan. Four of the building blocks comprise these prerequisite conditions and have the following individual goals:

- Maintain and improve the high safety and reliability performance of operating plants.
- Achieve progress with the high-level waste (spent fuel) disposal system that includes a permanent repository and a temporary monitored retrievable storage facility.
- Assure availability of low-level nuclear plant waste disposal capacity.
- Assure a continuing stable and economic supply of nuclear fuel.

B. Generic Safety/Environmental Regulation and Industry Standards

Construction of new nuclear plants requires a stable and predictable safety and environmental regulatory process. The primary need is for a combined construction and operating license. Companies must be able to obtain a license to operate the plant at the same time they obtain a license to construct it. The Nuclear Regulatory Commission (NRC) issued a new rule on this subject in 1989, titled "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Reactors" (10 CFR 52). In implementing the new rule, the design certifications and combined licenses must be based on standardized regulatory requirements that would not vary or be changed throughout the life of the design certification or the life of the plant, unless stringent backfit criteria were applicable. They must also include Inspections, Tests, Analyses, and Acceptance Criteria, including a "sign as you go" process, which will assure the regulator and the owner that the plant is built in accordance with the licensing requirements established during the combined license review and hearings. Another key task is reconciling regulatory definitions and jurisdiction among the NRC, the Environmental Protection Agency (EPA), and state safety and environmental regulatory agencies. The two goals of this building block are:

- Assure that regulatory processes are in place for predictable licensing, including site approval and design certification, for construction, startup and commencement of full-power operation of new plants.

- Assure that a high-quality, stable regulatory process is in place to assure safety and environmental protection, and to encourage industry self-improvement initiatives, public confidence, and reasonable cost of electricity.

To assure higher confidence in both safety and economic performance, future plants must be designed to incorporate lessons learned over the past 30 years of commercial nuclear power operation. The next generation of plants must also use features that have been proven adequate for safe, reliable, and economic service with respect to operations and maintenance. This should obviate the need for prototype testing prior to commercial usage. The building block to address these needs is based on the concept of user-defined design requirements and has the following goals:

- Complete ALWR Utility Requirements Document and obtain NRC approval.

- Assure that ALWR designs meet the intent of the ALWR Utility Requirements Document.

C. Project-Specific Activities

The building blocks in this group are the technical activities of design, development and testing, site qualification, regulatory review, and project cost and schedule estimates. These provide the construction and operational specifications for the plant. The first major design and testing activity is that required to obtain design certification from the NRC. The second design step, called first-of-a-kind engineering, is the additional design and confirmatory testing necessary to produce the construction drawings, equipment specifications, construction and operational procedures, and final cost and schedule estimates to permit start of construction. Selection, qualification, and licensing of suitable plant sites must proceed in parallel with these design activities and the results factored into the first-of-a-kind engineering processes.

The industry's fundamental objective in these design processes is to achieve standardization--a family (or families) of plants that are essentially the same. The French and Canadian experience in nuclear power has clearly shown that major economies can be achieved through standardization. It eliminates duplication of detailed design and licensing from plant to plant, and provides for a "learning curve" in construction and operation from plant to plant. The definition and implementation of design standardization is a key milestone in the "Predictable Licensing" and "First-of-a-Kind Engineering" building blocks and impacts many other building blocks. In addition, the plan provides for enhanced standardization beyond design to extend the full benefits of standardization to the construction and operating phases, and to

assure that individual plants are not customized through uncoordinated changes by plant owners after operation commences.

The goals of the four building blocks in this category are:

- Obtain NRC certification of ALWR designs.
- Obtain NRC approval of suitable site(s) for new nuclear plants, either through early site permitting or through submission of an application for a combined construction and operating license and NRC approval to build and operate the plant to a certified design under its standardization rule.
- Complete engineering on certified designs in sufficient detail to define firm cost estimates and prepare for construction of ALWR plants.
- Ensure that an institutional infrastructure is in place to provide resources and manage completion of detailed design.
- Define the process to achieve standardization in first-of-a-kind engineering.
- Develop enhanced standardization concepts and cooperative arrangements as a means to increase the predictability of construction cost and schedules, and to improve operational reliability and cost.

D. Institutional Steps

The final four building blocks move from the relatively "narrow" world of the nuclear power industry and its safety and environmental regulators to the "wide" world of financing, rate regulation, public acceptance, and governmental support.

Many lessons have been learned in the "narrow" world which, along with significant innovations, are being incorporated into the first ten building blocks. This Strategic Plan, however, also recognizes the lack of sufficient confidence and support in this "wide" world. The plan addresses this issue in the final four building blocks, which have the following goals:

- Achieve broad U.S. public acceptance of nuclear power, and local public attitudes, at potential plant sites, which are conducive to plant construction and operation.
- Develop a structure for financing, ownership, and operation of nuclear plants which reasonably compensates investors/lenders for associated risks.

- Achieve support by state regulatory agencies for predictable and stable handling of permitting and financial matters.

- Enhance governmental support for the necessary institutional framework, including laws, regulations, and programs, that encourage the construction and operation of new nuclear plants.

A strong element of the plan, which is key to the success of these last four building blocks, is to communicate the results of the previous building blocks broadly outside the industry. This will provide visibility to this "wide" world audience of the benefits of the country's investment in nuclear power; and of the major improvements in current plant operations and in future nuclear power plant designs, particularly their safety features and the effectiveness of their safety and environmental regulation. It will also provide the foundation, through standardization, detailed design and planning, and stable nuclear regulation, on which the confidence of the rate regulators and financial analysts can be built.

IMPLEMENTATION OF THE PLAN

The plan is divided into building blocks that are integrated into an overall plan. Each block has a separate organization as the lead responsible for achieving one or more subordinate goals. Each block also has a series of milestones that will assist in monitoring and managing the project. Blocks are linked together by "tie-ins" to ensure coordination between the diverse organizations and the subordinate projects. This ensures that the schedule is monitored, maintained and that the final goal, a standardized nuclear power plant on-line by the turn of the century, is achieved.

Action plans have been developed for each building block. Each lead organization is responsible for implementing its phase of the plan utilizing its own resources, augmented as required, to achieve the block's goal(s). Each block has a series of supporting organizations assigned to provide input and assistance to the lead organization as required. Significant portions of the plan are well underway. These ongoing efforts include technical and safety regulation activities on present and future plants, and public/political acceptance programs more focused on the present issues in the industry.

The plan also recognizes that success in achieving the goals depends on government actions as well as industry. Where government rather than industry has the basic responsibility and authority over a building block, "primary" or "regulatory" responsibility is given to a government agency, not as an assignment, but to recognize that authority. The "industry lead" organization is assigned responsibility for providing input to the processes in that building block. "Primary" responsibility is also assigned to industry organizations where the eventual implementation requires that one or more industry organizations become

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involved through a major commitment of funds. In such cases, the "lead industry" organization will handle the building block in the interim.

NPOC established an Ad Hoc Committee early in 1990 to develop this plan. That task has now been accomplished. The Ad Hoc Committee will now coordinate the work of the lead industry organizations on behalf of NPOC. This coordination, and periodic assessments of progress against the plan, will allow adjustments to the plan. The explicit portrayal of "tie-ins" encourages "self-coordination" to minimize overall project management requirements in this formative time frame.

The Ad Hoc Committee is specifically charged to:

- facilitate the coordination of the action plans among those having the lead responsibilities in order to achieve consistency, mutual support, and compatibility among the action plans in a total team effort;

- facilitate the implementation and effectiveness of the Strategic Plan by monitoring and reporting progress on the various action plans and recommending to NPOC changes to the Strategic Plan where appropriate; and

- identify, recommend, and foster the needed government-industry shared efforts.

Of course, project management will eventually be needed to carry out the detailed activities as the plan matures. Much of this will have to be provided by the organization(s) that see the need to order new plants. Past experience shows that an outstanding project management team is essential to assure that schedules and budgets are met and to instill confidence in those providing and approving the financial arrangements. The timing for formation of any such organization will presumably coincide with accomplishment of the second goal of the Ad Hoc Committee, complementary to the first goal to develop the plan itself:

- to secure firm commitments from sponsoring organizations to devote the necessary resources to build and start operating one or more standardized ALWR nuclear plants.

Senator FORD. Thank you very much, Mr. Farley.

Senator Shelby wanted to be here for your testimony. You are one of his constituents.

Mr. FARLEY. Yes, sir.

Senator FORD. And he leans very heavily on your 40 years of experience in this business.

Mr. FARLEY. Thank you, sir.

Senator FORD. But apparently his plane is late and they have asked that I extend his greetings to you, and I have done that, with pleasure by the way.

Mr. FARLEY. Thank you.

Senator FORD. Dr. Kadak, do you want to highlight your statement. We have got a long way to go before the day is over, and I do not want to close anybody off. You will make your own decisions, but you may have to do a lot of writing after it is over with to answer questions. We get very, very—you know, when we go to send you a list of questions, rather than ask you 4 or 5, we will probably send you 45.

STATEMENT OF DR. ANDREW C. KADAK, PRESIDENT AND CHIEF EXECUTIVE OFFICER, YANKEE ATOMIC ELECTRIC CO.

Dr. KADAK. I will try to be brief. Thank you.

Good morning. My name is Andrew C. Kadak. I am president and chief executive officer of Yankee Atomic Electric Company. By the way, Yankee has been in the nuclear business since it started 30 years ago in the United States.

I am honored to be invited here to present testimony on our national energy security. Yankee supports this legislation's recognition that nuclear power is a vital part of our Nation's energy future. Specifically, we support a strategy that protects the consumer and the environment, promotes efficiency in energy use, that does not waste our natural and, as importantly, human resources, and allows for production of energy consistent with our needs.

Yankee wholeheartedly supports the objectives of titles XII and XIII and is greatly encouraged by the strong initiatives in the bill to remove the de facto moratorium on energy power development in the United States. In my opinion, the Johnston-Wallop bill goes a long way to restoring utility confidence in the future of nuclear power. It addresses some fundamental questions in a way that is both constructive and necessary to get a utility seriously interested in the next order.

The commitment of the Government to reform the licensing process and invest in research and development of the next generation energy plants is most significant. As significant is the safety net that is proposed in the bill to protect the utility against changes in the regulatory positions once construction has started.

The innovative thinking about Government actually earning returns on their investments in these nuclear facilities also shows some interesting promise to break the present moratorium on new nuclear plant construction. In my view, these are very strong signals indeed, not only to utilities who ultimately have to make the decision to purchase the next nuclear plant, but also to the invest-

ment community, whose support is essential for construction to begin.

Much remains to be done to put in place the details as to how this bill would actually function to create the positive technical and regulatory environment necessary to move ahead with nuclear power.

The research and development portion of the bill is properly focused. In the area of licensing reform, we can no longer afford the possibility of holding nuclear plants hostage if investors are to support new nuclear construction. While Yankee Atomic endorses and encourages efforts aimed at reviving the nuclear option, with new advanced design plants and an improved regulatory process, we feel it is also important not to forget the existing 112 commercial nuclear plants and the contribution that they can make to the energy security of the United States.

Consistent with the objectives of conservation and wise use of our energy resources, I would request that the committee consider endorsing the concept of nuclear power plant license renewal. Nuclear plant license renewal is a process specifically provided for in the Atomic Energy Act of 1954, which would allow qualifying facilities to extend their current 40-year operating licenses by as much as 20 additional years.

On a national scale, license renewal is not an option, but a necessity. It has been forecast that up to 200,000 megawatts of new generating capacity will be required in the next decade. Unfortunately, not much of this capacity has yet to reach groundbreaking.

To make matters worse, licenses for 35 nuclear energy plants representing about 30,000 megawatts of existing base load capacity will expire between the year 2000 and 2014. That capacity will have to be replaced.

I would emphasize that nuclear power plants currently provide 20 percent of the Nation's electricity. In fact, 20 States receive at least 25 percent of their electricity from the Nation's existing nuclear plants.

Renewing the licenses of our existing nuclear plants for 20 years is the equivalent of building 50 new nuclear plants or 50 new power plants. In effect, license renewal is the most fundamental form of conservation, getting the most out of what we have.

The American public's concern about the environment has emerged as one of the dominant forces that will shape the energy and electricity strategy of the 1990's. I believe license renewal is in concert with that public concern. If nuclear plant licenses are not renewed, it is reasonable to assume that some type of fossil capacity will replace it. If that happens, we will dump up to 11 billion tons of greenhouse gas CO_2 and up to 182 million tons of acid rain-producing SO_2 into the air, and fail to conserve our irreplaceable natural resources, such as oil and gas.

License renewal could displace up to 18 billion barrels of oil, which is equivalent to the total reserves of the Alaskan oil fields.

Senator MURKOWSKI. Which one?

[Laughter.]

Dr. KADAK. You tell me, Senator.

In today's dollars, the replacement capacity for existing nuclear plants could cost up to $300 billion. At about $150 a kilowatt, li-

cense renewal is cost competitive with many conservation and demand side management programs. At a time when oil imports are costing more than $50 billion a year, our Nation can ill afford the additional burden of losing a secure source of energy that these nuclear power plants provide.

The feasibility of operating a nuclear plant beyond its initial term is provided by design, assured by maintenance, refurbishment, and replacement, and proven by operation. As NRC regulations change to meet new requirements and technologies——

Senator WIRTH [presiding]. Dr. Kadak, let me do this if I can. We can all read the statement and I think that is available. I think probably what we would like to do is maybe get through this quickly and kind of get to Q and A, back and forth, if that is all right. If you could summarize——

Dr. KADAK. In summary, Senator.

Senator WIRTH [continuing]. That would be terrific.

Dr. KADAK. In summary, Senator.

Senator WIRTH. And then if we could go, Dr. Buckman, if we could go to you, and then maybe we could get into some exchange a little bit, I think that might be—thank you.

Dr. KADAK. All right. So let me just summarize. I think the American public supports license renewal. We have done some polls that indicate that over 75 percent of the Americans think that license renewal is important as a part of our national energy strategy. The President has included it in his administrative plan, and I would just like your support for that concept.

[The prepared statement of Dr. Kadak follows:]

PREPARED STATEMENT OF DR. ANDREW C. KADAK, PRESIDENT AND CHIEF EXECUTIVE OFFICER, YANKEE ATOMIC ELECTRIC CO.

Mr. Chairman and members of the committee, my name is Andrew C. Kadak and I am here today representing Yankee Atomic Electric Company, where I hold the position of President and Chief Executive Officer. I am a graduate of Union College and hold a doctorate degree in nuclear engineering from the Massachusetts Institute of Technology. I am a member of the NUMARC Issues Management Committee and serve on the Board of Directors of the American Nuclear Energy Council, American Nuclear Society, Electric Council of New England, the New England Council, and the American Committee on Radwaste Disposal.

I appreciate the opportunity to present this testimony in support of the comprehensive objectives of the proposed, "National Energy Security Act of 1991." My testimony today will focus on Yankee's area of expertise—commercial nuclear power technology. Yankee Atomic was organized in 1954 by ten utilities in New England to design, build, and operate the Yankee Nuclear Power Station in Rowe, Massachusetts. The Yankee organization was purposely focused on nuclear power plant design, construction, and operation. Thus, although Yankee is considered a utility, it really is a specialized generating company whose only business is nuclear operation and support.

Yankee Atomic fully endorses the legislation's inclusion of commercial nuclear power as an important part of a comprehensive national energy strategy which, while boldly addressing the nation's destabilizing reliance on imported oil, does not ignore the environmental imperative associated with a sale and secure future for this country. We in New England recognized early on the role of commercial nuclear power as a reliable, clean, and economical component within a diversified electric power supply mix. Starting with the Yankee plant, which began operation in 1960 as one of the nation's first commercial nuclear power plants, the New England region has constructed nine nuclear power plants which today provide one-third of all the region's electricity. Despite progress in reducing demand and diversifying supply, the region is still too dependent upon fossil fuels, using oil to generate about 40% of its electricity last year. Accordingly, Yankee is greatly encouraged by the

strong initiatives tatan in S. 341 to remove the de-facto moratorium on nuclear power development in the United States today.

Yankee Atomic shares your conviction that a balanced national energy strategy is required. Specifically, we support a strategy that: protects the consumer and the environment; promotes efficiency in energy use that does not waste our natural and human resources; and allows for the production of energy consistent with our needs.

Yankee wholeheartedly supports the objectives of Titles XII and XIII of the "National Security Act of 1991." As proposed, S. 341 directly confronts several of the key issues necessary to ensure the viability of nuclear power as a significant electric power production alternative in the nation's future. By instituting a licensing process for standardized nuclear reactor technologies that promotes both timely and meaningful public participation, as well as investor security, the legislation directly addresses the key uncertainties associated with the construction of new nuclear plants.

I am encouraged by DOE's recent activities which are supportive of NPOC's strategic plan to bring about the revitalization of the nuclear option. DOE has demonstrated a focus on design certification efforts which deserve Congressional support. DOE's current activities can bring about the maturity and feasibility of technologies that will be capable of early deployment by the industry, as well as those technologies that will be ready for a demonstration project. Once the market force is ready to select a technology for deployment or demonstration, we believe DOE has an important role in providing both the moral and financial support that will be necessary in the active construction of the next plant.

However, the demonstration program funding should be in addition to the appropriations for DOE's current activities. For instance, DOE has a commitment to plant license renewal and, in conjunction with EPRI and the industry, has established a "lead plant" program to demonstrate the license renewal process. The lead plant program will develop the acceptable technical, environmental, and institutional justifications required to operate a nuclear energy plant beyond its 40-year license term. So, while Yankee Atomic endorses and encourages the efforts aimed at reviving the nuclear option with new advanced design plants, we also feel it is important not to fc get the existing 112 commercial nuclear power plants.

I would stress that the significant contribution to the current energy security of this nation provided by the nation's currently operating nuclear power plants must not be overlooked in the consideration of the future energy security of the United States. Consistent with the objectives of conservation and wise use of our energy resources, I would request the Committee to consider strongly endorsing the concept of nuclear power plant license renewal. As specifically stated in Section 12002, of the proposed legislation, "energy generated from nuclear fission now supplants the burning of fossil fuels in an economical fashion and contributes substantially to safe and reliable supplies of electricity while reducing the rate and scope of environmental pollution."

The essential continued contribution of the nation's commercial nuclear power plants must be assured. Nuclear plant license renewal is a process specifically provided for in the Atomic Energy Act of 1954, which (under proposed regulation) will allow qualifying nuclear plants to extend their current 40-year operating license an additional 20 years. The Yankee Nuclear Power Station will again serve as a pioneer nuclear plant when, later this year, we submit the first-in-the nation license renewal application.

In my testimony, today, I would like to address nuclear license renewal, both why it is an integral and essential part of our national energy security, and why it is technically feasible. My testimony is supplemented with an attachment which provides a more detailed overview of nuclear plant license renewal for the Committee.

LICENSE RENEWALS IS A INTEGRAL PART OF OUR NATIONAL ENERGY SECURITY

On a national scale, license renewal is not an option but a necessity. The issues of electricity production, environmental protection, and economics, all converge on license renewal.

Electricity Production

In 1991, the persistence of the nearly perfect correlation between the overall performance of the economy and the consumption of electricity continues. It has been forecasted that up to 200,000 megawatts of new generating capacity will be required over the next decade. Unfortunately, not much of this capacity has yet to reach groundbreaking. As addressed in S. 341, conservation and demand side management will help to mitigate the rate of demand growth, but we have to face the fact that it won't eliminate demand. With supply margins dwindling, the nation is confronting

serious future electricity shortages which could exceed those that have already occurred in Massachusetts during 1988, Florida and Texas in 1989, and throughout the mid-Atlantic region in 1990.

Licenses for 35 nuclear energy plants—representing about 30,000 megawatts of existing base load capacity—will expire between 2000 and 2014. That capacity will have to be replaced—at a time when electric utilities will already be hard-pressed to meet growth in electricity demand. I would emphasize that nuclear power plants currently provide 20% of the nations electricity. In fact, 20 states received at least 25% of their electricity in 1990 from the nation's existing nuclear plants.

Renewing the licenses of our existing nuclear power plants for twenty years is the equivalent of building 50 new plants. In effect, license renewal is the most fundamental form of conservation—getting the most out of what we have for as long as we can.

Environmental Protection

The American public's concern about the environment has emerged as one of the dominant forces that will shape the energy and electricity strategy of the 1990's. I believe that license renewal is in step with this public concern, as its environmental advantages are staggering.

If nuclear power plant licenses are not renewed, then given the short-term need and the current reluctance of utilities to build new nuclear capacity, it is reasonable to assume that some type of fossil capacity will replace it. Using that logic, it is easy to quantify the environmental benefit of nuclear plant license renewal.

The first benefit is: Avoided discharge of up to an additional 11 billion tons of the greenhouse gas CO_2 into the air.

The second benefit is: Avoided discharge of up to 182 million tons of acid rain producing SO_2 into the air.

And, the third benefit is: Increased conservation of irreplaceable natural resources like oil. License renewal could displace up to 18 billion barrels of oil, which is equivalent to the total reserves of the Alaskan oil fields.

Affordable Electricity

The need for electrical generating capacity and environmental protection always has a price, but with license renewal, electricity will be more affordable and our nation's energy supply more secure.

For example, in today's dollars, the replacement capacity for existing nuclear plants would cost between $100 and $300 billion depending upon the technology used. I would also like to point out that at about $150/kW, license renewal of the nation's nuclear plants is cost competitive with conservation and demand side management programs.

In addition, at a time when U.S. domestic oil production is declining and oil imports are costing more than $50 billion a year, our nation cannot afford the additional burden of losing the secure source of energy provided by existing nuclear power plants. The recent crisis in the Persian Gulf once again demonstrates our great reliance on foreign energy sources.

In short, license renewal is expensive only if it's not achieved.

LICENSE RENEWAL IS TECHNICALLY FEASIBLE

Operating a nuclear plant beyond its 40-year license is technically feasible. Although some technical factors were considered, the 40-year period was established on the basis of the time that a utility needs to pay off the plant's investment costs.

The feasibility of operating a nuclear power plant beyond its initial license term is provided by design, assured by maintenance, and proven by operation. Each of these points is worth a brief discussion.

First, nuclear power plants have robust designs and rugged construction. In their original design, engineers built into these plants excess margins. This initial overdesign provides the basis for continued operation.

Second, all plants maintain their level of safety through refurbishment and replacement of components.

Third, as NRC regulations change and new ones added to meet new requirements and technological advances, plants are required to make modifications or justify that existing systems satisfy the regulatory intent.

Finally, the important concept that a nuclear plant is kept up-to-date has been demonstrated by performance data from the 30-year old Yankee plant. Its performance has not deteriorated with age as its capacity factor has exceeded the industry average in all but three of the last 15 years. To say that plants become less reliable with age, simply isn't true.

CONCLUSION—LICENSE RENEWAL IS HERE NOW

The NRC already has the authority under the Atomic Energy Act to issue licenses to plants for 40 years and to renew those licenses. Moreover, the NRC's license renewal final rule is expected this June. That rule will establish the process for assuring that a plant's existing level of safety is maintained throughout the renewal period. A key part of the process will be a comprehensive safety examination of the plant.

In closing, I'd like to emphasize that the common sense of the license renewal concept has been recognized by the American public as, based on recent polls, over 75% think it's a good idea to issue license renewals to nuclear energy plants that meet federal safety standards. Moreover, President Bush specifically included license renewal in the administration's proposed National Energy Plan. I therefore urge this Committee to endorse license renewal as an important part of a multifaceted national energy policy.

Thank you Mr. Chairman for the opportunity to express my views on license renewal. I will be pleased to answer any questions that either you or the Committee may have.

[Supplement.]

SECTION I—OVERVIEW AND KEY DATA

Electricity from America's 112 nuclear energy plants makes a major contribution to U.S. energy supply, economic growth, energy security, energy efficiency, consumer well-being, and environmental protection. Renewing the operating licenses of these plants will ensure that Americans continue to receive these benefits. This supplement to my testimony before the Senate Energy and National Resource Committee provides a detailed overview of nuclear power plant license renewal as an integral and technically feasible component of our national energy strategy. Please note that the supplement reflects the most currently available data for the last full calendar year, which at this point is 1989.

LICENSE RENEWAL: THE BENEFITS AT A GLANCE

U.S. nuclear energy plants are scheduled to be retired starting in the year 2000. Without license renewal, the U.S. will lose an average of 5,000 megawatts of nuclear generating capacity every year between 2000 and 2030.

Renewing the licenses of the U.S. fleet of nuclear plants will preserve a substantial amount of electric generating capacity while saving the large sums of money that would otherwise be spent to replace that capacity.

If existing plants were to operate for 60 years rather than the currently licensed 40 years, they could add 1,400 gigawatt-years of capacity. That is 12.3 trillion kilowatt-hours of electricity—enough electricity to supply America's needs for almost five years at current rates of consumption.

The Department of Energy has estimated that renewing the license of a nuclear plant by 20 years would save $800 million to $1 billion in avoided costs on construction of new oil, coal, or natural gas fired plants. Nationwide, the savings could reach $350 billion.

License renewal is projected to cost about $150 to $250 per kilowatt; construction of a new fossil fuel-fired plant of similar size would cost between $1,000 per kilowatt and $1,500 per kilowatt.

BENEFITS OF NUCLEAR ENERGY AND LICENSE RENEWAL

Economic Benefits

Nuclear energy has saved money for the nation and for consumers.

Nuclear energy has saved the U.S. over $125 billion in foreign oil payments since 1973.

Between 1973 and 1989, nuclear energy displaced a cumulative total of 4.3 billion barrels of oil, 1 billion tons of coal, and 6.5 trillion cubic feet of natural gas.

Between 1973 and 1989, consumers of nuclear-generated electricity saved over $45 billion compared with what they would have spent for electricity generated by other sources.

License renewal of the nation's nuclear plants would also help to relieve the nation's dependence on imported oil.

Environmental Benefits

Nuclear electricity meets the letter and spirit of the Clean Air Act.

Today, the nation's nuclear plants reduce sulfur dioxide emissions by five million tons annually. By the year 2000, the goal of the new Clean Air Act is to reduce annual sulfur dioxide emissions by 10 million tons.

The nation's existing nuclear plants also reduce nitrous oxide emissions by two million tons a year, the full amount called for in the Clean Air Act.

In addition, nuclear plants reduce carbon dioxide emissions. In 1988, U.S. utility emissions of carbon dioxide would have been 20 percent—or 128 million tons—higher without nuclear power.

Keeping the nation's nuclear power plants in operation for another 20 years would avoid the discharge of up to 11 billion tons of carbon dioxide (Greenhouse effect) and up to 182 million tons of sulfur dioxide (acid rain) into the atmosphere.

Increased conservation of irreplaceable natural resources is also realized through license renewal. For instance, up to 18 billion barrels of oil would be displaced which is equivalent to the total reserves of the Alaskan oil fields. Also, the consumption of up to 100 trillion cubic feet of natural gas would be avoided.

ELECTRICITY SUPPLY DEMAND: PROBLEMS IN THE 1990S

As the U.S. enters the 1990s, it faces significant problems meeting expected growth in the electricity demand. Without license renewal, those problems will be even more severe.

Growth in Demand Outpacing New Supplies

Since the Arab oil embargo in 1973, U.S. electricity use has increased by 54 percent. Between 1982 and early 1990, electricity sales increased by 22 percent, an average of 3.4 percent per year.

Construction of new generating facilities is at a 15-year low. New generating capacity planned or under construction will meet growth in electric demand of only about one percent a year. Utilities are reluctant to build new base load plants because of an uncertain regulatory climate at the federal, state, and local levels. This includes more than $14 billion in new nuclear plant construction costs disallowed by state public utility commissions during the 1980s.

Reliable Service at Risk

This growth in demand threatens reliability of service in several parts of the country. The New England region had eight brownouts in 1988, one in 1989. Even worse, there were rolling blackouts during the Christmas season of 1989 in Florida and Texas. The trend continued in the summer of 1990, when the mid-Atlantic region experienced its worst supply disruptions in almost 20 years.

To maintain reliable electrical service, the U.S. will need to add between 100,000 and 200,000 megawatts of new capacity by the early 2000's (assuming electric demand grows by two to three percent a year). Yet only 72,000 megawatts of new capacity are planned, according to the North American Electric Reliability Council (NERC).

Even these 72,000 additional "planned" megawatts are questionable, according to NERC. For example:

Sixty-three percent of this planned new capacity is not yet under construction. Because it can take eight years or more to build a new power plant, some of it may not be completed on schedule.

Of the 24 percent of planned additions that are under construction and more than 50 percent complete, two-thirds are nuclear units whose future operating status is uncertain.

One-fourth of the planned new capacity is expected to be built by Non-Utility Generators (NUGs), such as independent power producers or industrial cogenerators. Because of the large number of NUGs under contract, utilities are assessing whether these units will meet their scheduled service dates. Other concerns include NUGs' commitment to the purchasing utility, their long-term economic durability, their operation and control, and the adequacy of their fuel supply. At this time, there is a scant track record on which to judge the likelihood of their success.

According to National Economic Research Associates, unless the current recession turns out to be much worse than it seems to be, that electricity growth will still be 1.4% in 1991 and over 2% per year for 1992 through 2000.

Other Threats to Reliable Electric Service

In the last few years, actual utility peak demand in many regions has exceeded utility forecasts. Over the last three years, 81 percent of NERC's regional forecasts have been low, by as much as 10.3 percent. In 1988, the forecast was exceeded in all nine NERC regions; the total underestimation was more than 31,000 megawatts.

Utilities are counting heavily on load management, higher efficiency, and conservation to help meet demand through the 1990s. In NERC's latest assessment, utility estimates of the contribution from direct-control load management increased 30 percent from the previous year. But, if customer acceptance of these programs is less than expected, additional supplies will be needed to fill the gap.

The acid rain provisions of the Clean Air Act could also have a drainage effect on electricity supply, especially in the Midwest. The NERC has estimated that the legislation could result in a capacity loss of 12,600 megawatts. This capacity represents those power plants that could no longer be economically operated, either because of the expense of retrofitting emission control equipment or the reduction in plant output as a result of complying with the law.

ELECTRICITY USE AND ECONOMIC GROWTH

Electricity is important to U.S. economic growth. For the last 17 years, the growth in electricity use has closely tracked the growth of the U.S. economy.

From 1973 to 1989, the nation's gross national product grew by 51 percent. Over this same period, electricity use increased by 54 percent.

In contrast, the use of nonelectric energy—coal, natural gas, oil—fell by four percent. However, a steadily rising proportion of that energy has gone to electricity generation.

In 1973, nearly 20 quadrillion Btu of energy—or 27 percent—were used to produce electricity. By 1989, that figure had grown to nearly 30 quadrillion Btu—or 36 percent.

Growing Electricity Use

All sectors are using more electricity. The increases in use since 1973 are:

29 percent in the industrial sector.
83 percent in the commercial sector.
53 percent in the residential sector.

SOURCES OF ELECTRICITY

Nuclear Energy's Contribution

U.S. nuclear plants generated 529.4 billion kilowatt-hours of electricity in 1989, or 19.1 percent of total U.S. electricity production. This is enough to meet the needs of more than 50 million households.

Nuclear energy supplies 20 percent of the nation's electricity, and represents at least 30 percent of the supply in 15 states. All totaled, nuclear energy supplies electricity to 32 of the nations 50 states.

SECTION II—LICENSE RENEWAL REGULATORY/LEGAL ISSUES

BACKGROUND ON NUCLEAR PLANT REGULATION

How Plants Are Regulated

Congress assigned responsibility, through the Atomic Energy Act of 1954, for regulating nuclear power plants to the U.S. Nuclear Regulatory Commission (NRC), an independent federal agency charged with protecting the public health and safety.

The NRC regulates the operation of nuclear energy plants through design approvals, review of operating limits, inspections, and oversight.

The operating requirements are strictly enforced and include those imposed by NRC regulations, specific requirements to individual plant operating licenses, and commitments made by a plant.

This combination of design and operational reviews, regulatory requirements, and persistent oversight provides continuing assurance of safe nuclear plant operation.

In its deliberations for the Atomic Energy Act of 1954, Congress selected a license limit of 40 years that was subject to renewal. Although some technical factors were considered, the 40-year period was established using the time required for a utility to pay off the plant's investment cost.

NRC Oversight/Upgrade Requirements

Once a nuclear power plant receives approval to operate, it comes under a vigorous and continuous program of monitoring and oversight by the NRC. This NRC oversight ensures that a plant's level of safety is maintained regardless of age. This oversight would continue throughout a license renewal term.

NRC regulation includes: the on-site presence of one or two full-time, resident inspectors who conduct standard inspections and review of license activities; extensive periodic inspection programs conducted by specialist inspectors from NRC's regional offices; special team inspections conducted by NRC's Washington headquarters; and systematic assessments of licensee performance conducted for all key safety areas.

A conservative estimate is that each plant receives 3,000-6,000 hours of NRC inspections and analysis each year. The results of these inspections are well-documented and available at all times for public scrutiny.

The NRC also has the authority, at any time, to order a shutdown if the plant's accepted level of safety is found to be degraded or its compliance with federal regulations substandard. There are several instances of the NRC using this authority.

The NRC has been working to develop an effective renewal process that will ensure the safety of continued operation beyond the initial 40-year license term.

This work is designed to establish the technical and procedural criteria for license renewal, and resolve the major policy issues early enough to accommodate the planning and preparation that will be necessary to renew a plant's operating license.

If an existing nuclear plant does not renew its license, approximately 10-12 years will be required for planning and building a new power plant to replace that capacity. Therefore, to plan for future electric power needs, several electric utilities must determine by around 1995 whether they can be issued a renewed license. This requires that the policy, criteria, process, and regulatory guidance for license renewal be in place by mid-1991.

Major Events to Date

The NRC published a request for public comment on the development of a license renewal policy on November 6, 1986. The NRC solicited comments on seven major issues and received 58 written comments from a cross section of utilities, special interest groups, private citizens, independent consultants, and government agencies.

In February 1987, the nuclear energy industry submitted comments on the license renewal policy. The industry argued that renewal of a nuclear plant's operating license should be based on the plant's current licensing basis, and subject to a comprehensive, focused examination of the effects of age on certain plant systems, structures, and components.

After reviewing all comments, the NRC decided to proceed directly with rulemaking. On August 29, 1988, the NRC published an Advance Notice of Proposed Rulemaking that described regulatory options being considered by the NRC and solicited comments.

The NRC published a proposed rule for public comment on July 17, 1990.

THE LICENSE RENEWAL RULEMAKING

The NRC's proposed regulation is actually part of a larger "program" to address plant license renewals. The program consists of:

The proposed regulation;

A change to current NRC regulations concerning generic environmental considerations;

The development of regulatory guides for use by applicants;

The development of standard review plans for use by the NRC in reviewing applications; and

The evaluation of several industry technical reports.

Environmental Concerns

The NRC plans to conduct a generic assessment of the environmental impact of license renewal. Applicants for license renewal will be able to refer to this generic assessment in the environmental report accompanying their license renewal applications. This will allow the NRC to address environmental issues generically, without revisiting them in each individual license renewal proceeding.

The industry, through the Nuclear Management and Resources Council (NUMARC), conducted a study that found no significant environmental impact from license renewal.

Regulatory Guides

Regulatory guides are documents that detail a method found by the NRC to be sufficient to meet a regulation. The NRC will develop regulatory guides that prescribe the format and content of technical information to be included in a license renewal application.

The regulatory guides will also describe how to identify plant systems, structures, and components (pumps, piping, motors, valves, etc.) that must be maintained or replaced as they become affected by age.

The industry has developed a screening methodology to identify those plant systems, structures, and components that must be maintained or replaced as they become affected by age and has submitted the report to the NRC for review and approval.

License Renewal Regulation

During the license renewal term, the NRC will ensure, as it currently does for plants in their initial term, that a plant continues to operate safely. NRC will ensure this through weekly, periodic and special inspections and other regulatory oversight activities.

Under the NRC's proposed license renewal regulation, a plant is judged to be operating safely it if complies with applicable regulations. NRC conducts periodic inspections to confirm regulatory compliance.

The proposed regulation also assumes that a plant will continue to operate safely as long as it meets the requirements of its existing licensing basis, subject to a review and evaluation of age-related degradation of significant systems, structures, and components.

The NRC's proposed regulation:

Defines the process that applicants must follow to renew an operating license.

Defines the safety standards that each plant must meet for the NRC to approve the license renewal application.

Requires each plant to identify significant systems, structures, and components subject to wear-out (aging), and ensure through maintenance, inspection, surveillance, monitoring, testing, and/or trending that the equipment will continue to perform the function for which it is intended.

HOW LICENSE RENEWAL WILL WORK

Each plant wishing to renew its operating license must submit an application. The application must include the following:

Identification of systems and equipment that would be affected by age;

Identification of the programs to manage the effects of aging; and

An environmental analysis identifying the impacts, if any, of license renewal.

Many plant systems, structures, and components are already subject to a variety of programs to detect and prevent potentially significant aging. Requiring documentation of those programs ensures that the proper activities are in place to manage aging so that plant safety is maintained during the renewal license term.

To determine what plant equipment contributes to safe operation and is subject to aging, each plant applying to renew its license will undertake a comprehensive yet focused examination of the plant to identify plant systems and parts that contribute to plant safety and determine the ones for which aging is potentially significant to plant safety. For equipment identified as requiring further review for aging effects, each plant will evaluate the aging degradation mechanism and the aging management strategies available to ensure continued operability during the renewal term.

As a practical matter, nuclear plants have active inspection, maintenance, and testing programs that address the reliability and performance of equipment over time. These programs will be continued during the renewal term to ensure safety is maintained.

THE SCHEDULE FOR LICENSE RENEWAL

The Lead Plant Program

In conjunction with DOE and EPRI, the industry has a "lead plant" program to demonstrate the license renewal process. The lead plant program will establish acceptable technical, environmental, and institutional justifications required to operate a nuclear energy plant beyond its 40-year license term.

Two nuclear energy plants are preparing their applications for license renewal:

Yankee Rowe, a 185-megawatt Pressurized Water Reactor (PWR) that started operating in 1960. Its license will expire in 2000.

Monticello, a 545-megawatt Boiling Water Reactor (BWR) that started operating in 1971. Its license expires in 2011.

The license renewal review process is expected to take approximately two years once an application is submitted. A plant would be allowed to continue to operate under the conditions of its current license while the application is under review.

The NRC Schedule

The NRC's current schedule is to have a final regulation in place in time for receipt of the first license renewal application. The NRC published a proposed rule for public comment in July 1990, and plans to issue a final rule in June 1991.

Yankee Rowe plans to submit its license renewal application in September 1991, Monticello in December 1991. The NRC expects to take two years to complete the review of a plant's application.

The draft environmental regulation associated with the license renewal rulemaking is scheduled to be published for public comment in June 1991 and issued in final form in May 1992.

Section III—Technical Issues

FEASIBILITY

Four factors ensure that a nuclear energy plant can operate safely and reliably beyond its initial 40-year license term:

Its design;

Licensee maintenance, surveillance, and testing actions;

The NRC's continuous oversight and periodic requirements for plant equipment upgrading; and

Performance.

Plant Design

Nuclear energy plants are conservatively designed to provide excess safety and durability. The designs center around diverse and redundant safety systems: if one should be inoperative, another is available ("safety in depth"). The quantity and quality of materials required by the design specifications provide rugged durability that is far in excess of the plant's initial 40-year license term. One of the reasons nuclear plants cost so much to build is that they are very conservatively designed and built to exacting standards.

Several studies in the late 1970's concluded that the conservatism in nuclear plant designs would enable permanent equipment to function normally for decades after the initial license term. These studies were validated in the early 1980's through evaluations sponsored by the U.S. Department of Energy and the Electric Power Research Institute. These pilot studies systematically examined the Surry 1 and Monticello plants, primarily addressing the technical feasibility of life extension, and concluded that "there were not technical obstacles which would preclude life extension of 20-30 years, although a number of areas require further investigation." From this it can be concluded that safe and reliable nuclear power plant operation is technically feasible for up to 70 years.

Licensee Maintenance, Surveillance, and Testing

The safety requirements applied to each plant by the NRC must be maintained in accordance with strict federal regulations and industry standards regardless of a plant's chronological age.

The licensee must conduct rigorous and virtually continuous maintenance and other related activities to keep plant equipment as good as new.

Maintenance is one of the biggest items in a nuclear plant budget—not because of breakdowns, but because of checkups and performance of "preventive maintenance."

Equipment and individual components (pumps, valves, pipes, electrical equipment, etc.) are routinely replaced as they wear out. For example, the Yankee plant in Massachusetts, which has operated for 30 years, has installed replacement electronics and instrumentation which even some of the newest plants do not yet have.

To ensure that maintenance and replacement activities take place on a timely basis, NRC requires every nuclear plant to have a comprehensive equipment surveillance and testing program as a condition of being allowed to operate.

Plants perform at least several hundred surveillances and tests every year, depending on size and design. These range from starting up back-up equipment to make sure it is available if needed, to detailed visual inspections of individual com-

ponents. Some are conducted several times a day, others weekly or monthly or during refueling outages.

In addition to the hundreds of routine tests and surveillances, regulations also require a special examination called an "Inservice Inspection" (ISI). If the ISI (performed while the plant is shutdown for refueling) reveals deficiencies, then corrective action is required as a condition of further operation.

As a result, length of operation does not indicate an outdated or deteriorated commercial nuclear energy plant.

NRC Oversight/Upgrade Requirements

Once a nuclear energy plant receives approval to operate, it comes under a vigorous and continuous program of monitoring and oversight by the NRC. NRC oversight ensures that a plant's level of safety is maintained regardless of age. This would continue throughout a license renewal term.

NRC oversight includes: the on-site presence of one or two full-time, resident inspectors who conduct daily standard inspections and review of license activities; extensive periodic inspection programs conducted by specialist inspectors from NRC's regional offices; special team inspections conducted by NRC's Washington headquarters; and systematic assessments of licensee performance conducted for all key safety areas.

A conservative estimate is that each plant receives 3,000-6,000 hours of NRC inspections and analysis each year. The results of these inspections are well-documented and are available at all times for public scrutiny.

The NRC also has the authority, at any time, to order a shutdown if the plant's accepted level of safety is found to be degraded or its compliance with federal regulations substandard. There are several instances of the NRC using this authority.

Performance data show that, with few exceptions, nuclear plant performance remains steady and reliable over time and is independent of chronological age.

The performance of the Yankee plant in Massachusetts has not deteriorated over 30 years of operation, as its capacity factor has exceeded the industry average in all but three of the last 15 years. In 1989, Yankee had its fourth highest generation year in its 30-year history, and, in 1990, completed a 297 continuous day run of operation, its second longest ever.

Nuclear plant performance is in stark contrast to coal-fired power plant performance, which does deteriorate over time. This is because coal-fired power plants are subjected to the same stringent regulatory requirements, comprehensive monitoring, and maintenance.

Over the long haul, the construction, maintenance, and regulatory expenses of running a nuclear power plant pay off through reliable performance that is independent of plant age.

PLANT SAFETY EXAMINATION PROCESS

The license renewal examination process begins with a comprehensive systematic examination of all plant systems and structures, followed by a more focused evaluation at the component level.

This examination is focused on identifying and evaluating equipment significant to safe operation and subject to age-related degradation.

The objective is to ensure that programs are in place to manage age-related degradation of safety-related equipment.

There are three categories of equipment components in nuclear power plants:

Those that are routinely inspected, refurbished, or replaced (short life subject to routine replacement).

Those that have lifetimes in excess of the range of license renewal (unlimited life); and

Those that have lifetimes within the range of license renewal (relatively long life).

Short Life Subject to Routine Replacement

Moving parts eventually wear out, a fact of life that applies to any type of machinery from cars to refrigerators to electric power plants.

Nuclear energy plants have extensive monitoring and maintenance programs to replace or refurbish such components on a routine basis.

Clearly, if a pump, motorized valve, or electrical switch is replaced or overhauled every five years, it has no chronological relationship to the plant's overall age or, for that matter, which license term it is in.

Such routinely refurbished or replaced equipment need not be included in the license renewal examination, but will continue to be maintained under existing programs.

Unlimited Life

Some plant structures will last a very long time. For example, a 20-foot-thick, reinforced concrete foundation that is anchored to bedrock does not need to be included in the license renewal examination because its lifetime certainly exceeds the license renewal period.

Relatively Long Life

Some equipment is not routinely replaced or refurbished because its lifetime is on the order of 40-70 years. Equipment in this group that is also related to plant safety must receive a detailed examination for license renewal.

EXAMINATION METHODOLOGY

Overview

A step-by-step methodology will be used for conducting license renewal safety examinations.

This methodology ensures that the examination is comprehensive, consistent, and applies NRC-approved criteria for determining the ability of plant equipment to meet federal safety standards throughout the renewal term.

The safety examination process is detailed and prescriptive and requires considerable resources by the licensee to complete. For example, renewal examinations for a nuclear plant like Yankee will require over 70 years of professional staff effort.

The results of the examination must be well documented and submitted as part of a license renewal application to the NRC for approval.

More Details on the Plant Examination Process

The plant examination process involves three fundamental steps:

Identifying equipment (systems, structures, and components) necessary to ensure continued safe plant operation (i.e., important to license renewal).

In this initial step, the plant is examined against approved criteria to determine which equipment or components perform safety functions and are subject to wearing out. It is this type of equipment that will receive a more detailed examination. All other equipment will be excluded from further examination but remains subject to continued maintenance as currently required.

Review of existing replacement, refurbishment, and inspection programs for systems, structures, and components important to license renewal. This step takes into account the existing plant programs which effectively manage age-related degradation of equipment needed to ensure safety. For instance, if a pump that is important to a plant safety system is already subjected to a maintenance program where it is monitored and replaced or refurbished such that its function is ensured as required, there is no need for further examination as part of the license renewal process.

Assess the potential for age-related degradation of the remaining equipment and components, and necessary actions to prevent or mitigate such degradation. This is the step where the examination becomes most focused. If necessary, there are several actions that the license must take to comply with federal safety standards during the renewal term. These include:

Demonstrate through plant operation and maintenance practices that the degradation is being managed or can be managed through changes thereto.

Demonstrate through analysis that future degradation will not be significant, either in magnitude or impact on safety (meaning no action is necessary).

Implement programmatic or hardware replacement.

Senator WIRTH. Thank you very much.

Dr. Buckman.

STATEMENT OF DR. FREDERICK W. BUCKMAN, PRESIDENT AND CHIEF OPERATING OFFICER, CONSUMERS POWER CO.

Dr. BUCKMAN. Thank you, Senator.

I am Fred Buckman. I am the president and chief operating officer of Consumers Power Company. I do have a formal statement, which I would like put in the record and I will summarize it.

Senator WIRTH. It will be included in full in the record.

Dr. BUCKMAN. I will summarize it very briefly. I believe that the proposed legislation is the most significant effort in the energy business since we had the moral declaration of war by President Carter in the late 1970's. I appreciate the leadership of the sponsors and I believe that it will go a long way toward helping us with solutions that are important in meeting this country's energy needs.

I would like to focus briefly on titles XII and XIII, but I would also like to say a few words about title XV, which I think is important in the context of the revitalization of nuclear energy. Why title XV? I would like to first say something about what I think the merits of title XV are. Title XV is legislation which will allow the creation of partnerships in the design, construction, engineering, and ownership of nuclear power plants. It will allow for the participation of all stakeholders in our industry and not just the utilities.

Lastly, it provides much more certainty in the financial regulatory treatment and regulatory environment in which these plants will operate. In many ways, title XV does for financial regulation what title XIII does for technical regulation of nuclear plants.

Consumers Power Company is at present creating an independent power plant, its Palisades plant, which will be owned by Consumers, Bechtel, and Westinghouse following completion. I believe that that IPP forms a structure for the type of ownership that will exist in large part for new nuclear plants that are built coming out of titles XII and XIII.

Let me go to title XII. The plant profile as outlined in section 12003 is one that would be a standard design, inherent and passively safe, modular, cost effective, reliable, environmentally sound, and would have no link to nuclear weapons.

I think that in the long run the plant which best fits that description of the ones which have been discussed today and are presently being considered by the Department of Energy is the MHTGR. It fits the profile. It is particularly attractive in its passively safe features and I think the opportunity for it to provide high reliability.

Consumers Power Company played a major part in a feasibility study looking at deploying the first MHTGR as a lead project. It was follow-up work to work that had formerly been done by Bechtel, Siemens, General Atomic, with broad support from the utility industry through the Gas-Cooled Reactor Associates.

The technology-based advantages of the MHTGR are significant. They are based principally on the fuel that is used and on the coolant that is used. I think that the MHTGR offers a potential for a level of public acceptance that just cannot be achieved with any other reactor type.

A cost effective way to develop the MHTGR in our environment, I believe, is through the NPR, the new production reactor. We have a national requirement, I believe, to build an NPR, and I think that combining the need to continue developing the MHTGR with the need to build an NPR anyway offers an opportunity to get the first full-scale plant built with a total investment much less than would be required if we treated the two projects and the two needs separately.

I think that the Department of Energy should look seriously at that and should continue to fund MHTGR in its annual funding.

With regard to title XIII, I speak to what I characterize as regulatory re-engineering, which is in effect re-engineering a power plant after it has been designed, after we have started engineering—after we have started construction and in fact after the plant has gone into operation.

This after-the-fact engineering is exorbitant, it creates high risk for operators, and it is the precise reason why no nuclear plants are being built today. I think that the key to getting back on track is a combination of standardized plants and combining the construction and operating license in a single proceeding as you have proposed.

If I might use as an example, in the airline industry when a new airplane type is proposed there is significant regulatory interaction and regulatory approval. For follow-up building of airplanes, all that is required is a certification that the plane was built in accordance with its design. That is exactly the type of interaction that I think should exist in the nuclear industry.

That would allow us to maintain our due process, assure that no rights are abridged, but at the same time make sure that one should not be allowed to gain through the abuse of the process that which he cannot attain through the merits of his argument.

I think that S. 341 is a bold, radical step. Consumers Power Company endorses its precepts. Specifically, I believe that titles XII and XIII, if properly implemented, will lead to public acceptance by replacing public skepticism about nuclear power with public confidence.

Thank you very much.

[The prepared statement of Dr. Buckman follows:]

PREPARED STATEMENT OF DR. FREDERICK W. BUCKMAN, PRESIDENT AND CHIEF OPERATING OFFICER, CONSUMERS POWER CO.

Mr. Chairman and Members of the Committee, my name is Frederick W. Buckman and I am President and Chief Operating Officer of Consumers Power Company (Consumers). Consumers is the fourth largest electric and gas company in the United States and its electric operations cover the outstate (non-Detroit) region of Michigan's Lower Peninsula. By way of background, I hold a doctorate in nuclear engineering from the Massachusetts Institute of Technology and have previously served as Vice President of Nuclear Operations for Consumers and as its Senior Vice President of Energy Supply.

I, and the management of Consumers, applaud you, Senator Johnston and Senator Wallop, for your introduction of the National Energy Security Act of 1991 (S. 341). This bill, and the Committee's early deliberation on it, represent the first serious broad look at our nation's energy policy since President Carter declared the "moral equivalent of war." While we reserve the opportunity to debate the details of S. 341 and the inevitable changes that will occur during the legislative process, Consumers is pleased to support the bill. Because we have studied Titles XII, XIII and XV most closely, we are particularly supportive of the Act's thrust in these areas. If the Committee were interested, we would be honored to comment on other Titles as well. Although my testimony will focus on Title XII, Advanced Nuclear Reactor Commercialization, and Title XIII, Nuclear Reactor Licensing, permit me to also comment on Title XV, Public Utility Holding Company Act Reform.

Why would I want to comment on Public Utility Holding Company Act (PUHCA) reform at a nuclear hearing? Because Consumers is seeking to establish an existing nuclear power plant as an independent power producer (IPP) and, I believe, the next commercial reactor will be an IPP (and, hopefully, an Exempt Wholesale Generator under Title XV).

Public health and safety risks are addressed in Title XII and Title XIII. But another significant risk to the further deployment of nuclear power plants is financial risk, both for the ratepayer and the investor. The IPP structure ameliorates this risk by spreading ownership (and the cost and liabilities) over several partners. Ratepayers' financial risk is limited to the extent a regulated utility is a partner in such a venture. While we seek regulatory authority to create an IPP at our Palisades Nuclear Plant (a plant that will be co-owned by Consumers, Bechtel and Westinghouse), I doubt that any new nuclear IPPs will be developed without the reform envisioned in Title XV.

The obstacles that exist today to the use of nuclear power can be boiled down to four broad areas: nuclear waste disposal; passive, standardized plant design; regulatory re-engineering requiring substantial design changes after construction has began and, most importantly, public acceptance driven by public confidence.

Congress has already acted on the disposal of nuclear waste and programs are currently underway to site a facility. While problems remain in the quest for a final site, I am convinced that these can be overcome and that the storage of existing nuclear waste is technologically possible. Once in place, a sound storage site should ailay public fears about disposal. Then industry must do its part by limiting the amount and strength of future plants' nuclear waste. Current advanced reactor designs will accomplish this.

The other obstacles, standardized passive design plant, regulatory re-engineering and public acceptance, are directly addressed by Title XII and Title XIII of S. 341.

Title XII makes essentially two findings which deserve mention because they go to the core of the debate on nuclear power. The first finding is that nuclear power is (or can be) economical, safe, reliable and environmentally sound. The empirical data of experience confirms this. The second finding is that the Government of the United States should provide the leadership for the furtherance of nuclear power. If S. 341 is enacted, this finding will have been satisfied.

In responding to the second area of concern, the nuclear industry must do its part in developing a plant design that is standard, inherently and passively safe, modular, cost effective, reliable and which produces no material appropriate for use in nuclear weapons. I have believed this for a long time and was pleased to see these points outlined in Section 12003 of Title XII. The best plant design for fulfilling the objective of Title XII is the Modular High Temperature Gas-Cooled Reactor (MHTGR). While competitive advanced reactor designs certainly have merit, they are simply not radical enough to employ all of the components of Title XII to the maximum extent possible.

During the past two years, we have applied our nuclear and overall corporate experience at Consumers in a Feasibility Study for deploying a Modular High Temperature Gas-Cooled Reactor Lead Project. This study was stimulated by an initiative from a prospective MHTGR vendor team of Bechtel, General Atomics and Siemens and included broad utility support through Gas-Cooled Reactor Associates (GCRA). We believe that the technology-based advantages of the MHTGR offer significant potential for our generation system and achieving corporate acceptance.

The MHTGR advantages derive from the inherent material properties associated with ceramic-coated fuel particles, graphite core structure and helium coolant. The adaptation of these inherent properties with design-specific features collectively assure a passive, self-limiting response for the full range of accidents considered for public health and safety protection. These characteristics result in enhanced safety margins without reliance on AC-powered safeguard systems and/or operator actions. These margins provide the technical basis for fulfilling the GCRA requirements of eliminating offsite public evacuation and sheltering plans. As a result, the MHTGR should provide eased siting and licensing plus improved overall public and investor acceptance. Other attendant benefits of the passive safety features include simplified operation and maintenance activities, improved reliability and availability, enhanced protection of the plant investment plus added sabotage resistance.

Further, we must break the connection, real and imagined, between nuclear power and the Nuclear Powers. The MHTGR once-through fuel cycle design with low enriched uranium yields important advantages with regard to proliferation resistance which is a stated objective of Sec. 12003 of S. 341.

The capability of adding variable generation capacity increments, in multiples of less than 175 MWe units, enhances the utility's overall system reliability and provides flexibility in meeting different size utility systems and/or uncertain load growths. The modular nature of the design approach increases the extent of shop fabrication, which enhances standardization, quality assurance, learning, cost/schedule certainty and overall cost competitiveness. This feature is also consistent with Sec. 12003.

The much higher steam quality and the physical separation of the nuclear island from a fossil plant-type energy conversion area also enhances cost competitiveness and facilitates a nuclear repowering option as well as a broad range of steam cycle cogeneration applications. Further, the MHTGR has unique technology growth potential for direct cycle-gas turbine electricity generation and high temperature process heat applications.

In addition, the Project Feasibility Study (PFS) included a technical, economic and licensing/siting assessment. The PFS developed one-step licensing strategy that builds on the recent developments in licensing reform and Advanced Light Water Reactor (ALWR) certification interactions. Particular emphasis was placed on project organization and the related cost/sharing arrangements that were built upon the generating company experiences of Consumers. The basic approach was that an independent power producing entity would purchase a fixed price, turnkey MHTGR Lead Plant if the price, combined with its estimates for owners costs, O&M costs, and other components of the resultant busbar costs would be competitive with an avoided coal plant. This plus the strategy of stable government support for 50 percent of the deployment costs plus indemnification provisions for risks under governmental control, captures the spirit of Title XII.

Consumers believes that there is broad utility support for fulfilling the national requirement for a New Production Reactor (NPR) through the deployment of MHTGR technology. We recognize that, in light of the overall resource demands and limitations, the NPR is a cost effective means of completing the development, building and operating an initial full scale MHTGR plant, conducting safety/performance tests to support certification and establishing a vendor/supplier infrastructure. The key, of course, is the degree to which the production and commercial designs and program infrastructures are similar. With reasonable similarity, the commercial MHTGR option can be achieved with a modest incremental civilian MHTGR program.

In our view, the U.S. Advanced Reactor Program may be characterized as a near-term effort for the certification of multiple ALWRs; a mid-term demonstration/certification effort for the MHTGR; and a mid-term fuel cycle demonstration plus a long-term plant demonstration/certification effort for the Integral Fast Reactor/Advanced Liquid Metal Reactor. With regard to the ALWR, the Nuclear Power Oversight Committee has prepared a comprehensive "Strategic Plan for Building New Nuclear Power Plants" which addresses generic issues and specific plans for implementing the ALWR option which build on the ongoing DOE/industry ALWR Program. Because of the maturity of the technology, the ALWR Program has been 50% co-funded by industry and no government support is envisioned for plant construction. The MHTGR is a follow-on competitive alternative to the ALWR and a complementary option ideally suited for close-in sites, smaller increments of capacity expansion and cogeneration/process heat applications.

Due to the first-of-a-kind design concept and innovative approach to safety and licensing, we need a full scale demonstration plant. Ideally, the New Production Reactor would satisfy the demonstration plant objectives, including safety/performance tests to support the certification of the commercial design. Fundamental to realizing this potential is the establishment of a stable incremental commercial MHTGR Program at a sufficient level such that certification is achievable commensurate with confirmatory testing support from the NPR.

In order to achieve the full potential of nuclear power, the United States should retain the full complement of these nuclear options. Instead of forcing an elimination of options through competition for limited funding, a clean coal-type program for commercializing multiple options is more attractive. The key is to conduct all programs in a tightly focused project development manner that are naturally sequenced with regard to market readiness for deployment. The main criteria for project deployment would be private sector readiness for 50 percent cost sharing, project management and, if applicable, revenue sharing. Responsibility for cost overruns under private sector control should be borne by the private sector; responsibility for cost overruns under public sector control should be borne by the public sector.

In any event, stable government support, including enabling legislation, is required for any of the advanced reactor programs to achieve commercialization. To that end, the provisions of Titles XII and XIII of the proposed National Energy Security Act are right on target.

The third area of concern is what I like to call "regulatory re-engineering." This occurs when a regulatory agency virtually redesigns a plant after construction has begun or, in some cases, even after construction has been completed. The cost of retrofitting a technically complicated entity like a nuclear power plant is exponen-

tially exorbitant compared to features incorporated into original design. While no one can, nor should, argue that truly effective design changes that substantially and materially improve plant safety should not be ordered, too often the changes mandated meet no such criteria. Standardized plant design, whereby we can debate its safety upfront, helps address this concern. So does the combined licensing called for in Title XIII.

The unoriginal analogy that best grasps the concepts of Title XIII is the aviation industry. When an airline company wants to license a new design (as opposed to an individual airplane) it petitions its regulators for approval of that design. Once approved, the airline company simply has to certify that it built each individual airplane in accordance with that design.

This process puts the major due process before the fact and requires that after-the-fact objections be confined to issues of nonconformance. It also provides what is currently sorely lacking today—certainty. Certainty benefits builders, operators, investors and intervenors of nuclear power plants. And it insures, after everyone is heard, the parties cannot attain through abuse of the process that which they cannot attain through the merit of their argument.

The final issue which I believe is addressed by all of the nuclear sections of S. 341 is public acceptance which must be, as previously stated, driven by public confidence in nuclear power. No one is more to blame for the current sorry state of the nuclear program than the nuclear industry itself. We engineers, who honestly believe in the inherent safety and efficacy of nuclear power, have done a poor job of convincing the general public of our view. And we have trouble accepting the notion that the American people, for whatever reason, can make the judgment that nuclear should not be a part of the nation's energy mix. They certainly have that right and they clearly have that power.

To change public skepticism into public confidence into public acceptance requires radical change. It requires radical change in government thinking and industry thinking. Streamlined licensing and development of the MHTGR answer this call for radical change. They do it in a way which combines government and private research and entrepreneurial talent, assures public safety, protects the environment and promotes an energy and actual security. If the government will do its part by enacting S. 341, I am sure that industry will enthusiastically do its part by designing and deploying the plant profiled in the Act. The result will be the avoidance of the "moral equivalent of war" or even war itself.

Senator WIRTH. Thank you very much, Dr. Buckman. We appreciate your summary.

Senator Wallop.

Senator WALLOP. I have a question for—is it Dr. KAY-dek or KED-dek?

Dr. KADAK. KAY-dek is fine.

Senator WALLOP. Each of you has indicated some level of support for S. 341, and that is much appreciated. I think it demonstrates that our purposes are mainly on track as to how to restore a public acceptance of nuclear power on the basis of some sound reason to be accepting, and that it is an important part of the national energy mix.

But the first question is, do you agree that any energy strategy ought to foster greater reliance on domestic energy resources?

Dr. KADAK. Without question. I do not see that as a debatable point.

Senator WALLOP. Then if we are serious about formulating a national energy strategy in this regard, why should not the Congress be also concerned about reports that your company ha entered into these long-term contracts with the Soviet Union to purchase enriched uranium?

Dr. KADAK. One is a service and the other is a basic ore question. We are going to the Soviet Union to buy a service of enrichment, which is really like a manufacturing process. The ore basically comes from either the United States or Canada.

Senator WALLOP. But if in fact, as seems to be the case, the Soviet Union is dumping enriched uranium and uranium onto international markets, one, is it not contrary to GATT? And two, by such purchases are you not effectively undermining the attempts by the Congress and the administration to preserve the financial and economic viability of the Federal enrichment process?

Dr. KADAK. I think perhaps our action has perhaps stimulated Congress to take some action relative to enrichment reform. Clearly, something has to be done with that in order to make it economically viable so that the consumers of this country do not get ripped off, and I do believe that that action and perhaps other actions that other companies have taken provided that necessary stimulus.

Senator WALLOP. Do you believe them to be dumping?

Dr. KADAK. I do not believe so, no.

Senator WALLOP. You do not believe that they are putting the enriched product on the market at less than the cost?

Dr. KADAK. I do not think so, no. From what we can tell, they just have a different process that is much more cost effective. It is the centrifuge process versus gaseous diffusion, which is cheaper, which everyone recognizes.

Senator WALLOP. Well, I would just have to say that at least some people believe that it is dumping and that certainly I would hope that, if you agreed on greater reliance on domestic energy sources, you will not be producing many of those domestic energy resources if you cannot process them. And if the processing part of the equation is in fact being heavily subsidized, then we are limiting ourselves.

I just, speaking for myself, I do not think it is a wise idea for this country to become dependent upon the Soviet Union for any of its energy resources.

Mr. FARLEY. Senator, may I address that? Our company is at this point 100 percent purchasing from the Department of Energy. So for our six plants at this point, we are on board domestically.

I must say, however, that we are concerned, and we have submitted testimony to this committee before on the subject of reform of the enrichment process at DOE, and we will be back again supporting that.

The problem that we face as a utility with regulated rates is that our local regulatory commissions look very carefully at the price we pay for our fossil fuels, for whatever it is that we burn, including uranium. And if there is a market out there at a much cheaper price for Soviet enriched fuel, we have a very difficult time explaining to our commission, our rate regulatory commission, and to our customers why we are choosing the domestic source.

I could not agree with you more, but it is why I am so wholeheartedly in support of the proposed legislation to make the enrichment process at DOE a much more effective and I think marketplace-oriented organization. I share your concern, but as a customer of DOE I worry very much about where we are going unless we can get something done. And I know it is not the United States Senate that has been the problem.

Senator WALLOP. I do, too, and I share that concern as well. I would just point out for any that are interested, there will be a hearing on Thursday on DOE's uranium policy.

I thank you.

Senator WIRTH. Gentlemen, maybe I might ask you to sort of help me think through this whole issue if you might. You all are coming in and talking quite technically but it seems to me that the problems in front of us at this point are not technical, they are more political and perceptive, what the public thinks about nuclear power and why.

It is my own belief that the world and the rules have changed very significantly in the last decade, that probably energy policy is not going to be driven by price, the way we assumed it was going to be in the 1970's and early 1980's. Instead energy policy is going to be driven by other variables over the next couple of decades, one of those being national security, referred to by Senator Wallop and others, and by environmental concerns; and that with this new world, I suggest that we ought to be refocusing again on nuclear, see what did not work in the past, is that going to be able to work, can we make it to work, and is that going to be a solution in the face of these new kind of conditions that surround an energy policy?

That may be a naive assumption that you can boil it down so, but I think that it is helpful to try to get down to some basic assumptions before we get into whether to pass title XII or title XV or whatever.

The second assumption that I make about this is that as the world is changing we are also seeing the world changing—and you mentioned this in your testimony, I think, Mr. Farley—a dramatically growing third world, that it is going to have to get its energy from somewhere.

Per capita consumption of energy in China may not be very great today, but their economy is growing very rapidly. So you are going to see an awful lot of consumption of energy, and what is going to be there? Is it going to be dirty brown coal and its contribution to all of the environmental problems, or are we going to have some other kind of technology?

So I come down to the assumption that it is our responsibility to future generations to look at this again. And as we look at it again, it is important, one, to get over the threshold: Are you or are you not going to look at it again?

And I get over that threshold saying I think it is our responsibility to look at it again. If in fact that is the case, then you say: Okay, what are we looking at? Why do we have to look at this again? And I come back and suggest that, as I have listened to this debate now for 17 years on various aspects of nuclear, I come down to four problems:

One, is a public sort of nuclear neuralgia about this, a perception that nuclear is unsafe, a sense, particularly coming out of Chernobyl, which is obviously a very sobering experience. You know, people look at Chernobyl, they see that kind of problem, and it is very understandable to say: "Hey, I do not think we ought to be pursuing that; that does not make a lot of sense to me." So number one is a major safety concern.

A second concern that comes up over and over and over again is the waste issue. You know, how are we going to solve the waste problem? We have that problem with the Fort Saint Vrain plant in

Colorado, which you are familiar with. What are we going to do? We cannot send it to Idaho, cannot send it to Nevada. What are we going to do with the waste issue? That problem sits out there as number two, I think.

A third one is cost-effectiveness. We look today at what is happening to power plants and what is happening to energy bills and it would appear that moving in with a major new nuclear technology is not going to be effective, at least in today's marketplace. Can we make this effective over a long-term period of time?

And fourth is the nonproliferation issue, a sense of the U.S., do we want to be in a situation in which there is any way, shape or form we can be encouraging proliferation of weapons?

I start by saying the world has changed. The conditions of looking at nuclear have changed. The third world has changed. We ought to get over the threshold and try it again. The threshold questions that then we have to ask are safety, waste, cost effectiveness, and nonproliferation.

Now, help me out. Is that an accurate progression of thought? Before we get to debating whether we are going to do title X, title Y, or title Z, it seems to me we have to establish a foundation.

I would ask my colleagues to jump in at any time. I thought it might be productive to have this kind of discussion. I always find Congressional hearings are probably the least efficient way of exchanging information. We do it, we put everything on the record. But I do not know, Senator Wellstone, if you and Senator Akaka want to jump in at any point.

Senator WELLSTONE. Mr. Chairman, I would just like to amplify what you said. I think there are some profoundly important questions that have to do with cost effectiveness, that have to do with the environment, that have to do with health and safety questions, that have to do with public perception, that are political and economic.

Senator WIRTH. Let me ask you, is that a framework that is useful, to say the world has changed, we have to get over that threshold, we have to answer those four questions? Is that accurate? Are there other things that ought to be in there? Have I left things out? Have I overemphasized some things?

I would really be very interested. You all have lived with this with great intensity. Dr. Buckman?

Dr. BUCKMAN. I would like to address that. I think that I would, first of all, I would say yes. But secondly, I would put the barriers into two categories, those which are permissives, things which are necessary to allow the utility industry or the nuclear industry to restart, and what you have listed are permissives, things which must happen effectively outside of us.

I believe that titles XII and XIII and to some extent XV speak to things within the industry: What do we have to have in order for us, once those permissives are dealt with, to restart?

Now, there is some connection in my view between what I would view as requirements from inside and permissives from outside. For example, the issue of public acceptance or neuralgia, as you characterize it, is one that concerns me greatly, and I think that I am concerned about putting forth designs for the next generation of nuclear power which are perfectly acceptable from a technology

point of view, but which from a perception standpoint are no different than what people have said no to for 20 years.

It is one of the reasons that I support continued funding of the MHTGR. It is different, it is identifiably different, and there are ways to show that the fundamental answer to the question what if is so what. And until we get to being able to communicate at that level, I believe that you will not see any rush back to nuclear from the industry, that the barriers that you have listed are all barriers that need to be dealt with.

I do think that there is work going on to deal with the waste issue. From a cost effectiveness standpoint, I guess I would say that there is a lot of first of a kind costs that will be associated with restarting the nuclear option that make it difficult to justify cost effectiveness, but over the long term, I think can be competitive with coal or with gas or other forms of energy.

Senator WIRTH. Any other reactions to that as a framework? Mr. Ka-DAK, is that right?

Dr. KADAK. KAY-dak. Thank you.

I do not think much has changed. It is just that we are looking at things a little differently. I think that the reason why nuclear power is getting a re-look is because of global climate change, it is because of a re-recognition of the fact that we are very dependent upon oil. And I think the way the re-look is taking place is it is getting viewed in the context of a bigger picture, not simply nuclear standing on its own, good or bad, but nuclear standing with other energy alternatives: What is going to be our major choice?

I think that is what the nuclear industry is trying to do, but to give an option that people will support to start a process that gets at the waste disposal solution and build a plant that can be bought and operated cost effectively. And that is what is going on right now.

I think what has changed is the broader look at nuclear, instead of a stand-alone technology, as one that is part of our options.

Senator WIRTH. One of those assumptions earlier.

Dr. Buckman, I really appreciate your kind of construct of what is external and what is internal. What is in the bill is really internal. What we have got to deal with is an environment out there that is dominated by those external questions.

Dr. BUCKMAN. That is right.

Senator WIRTH. We have probably got to be two-tracking these in some way, and that is the question that we face here, is how much do we put in this track now, when we have all these other problems to deal with? That was, I thought, very helpful.

Mr. Farley.

Mr. FARLEY. Certainly these four issues that you put out are very much in front of us. The one that I am probably least able to deal with is the nonproliferation issue, because it gets into dealings with overseas operations, the likes of Saddam Hussein. There is not much that we feel we can do to cope with that other than to support the efforts of the United States Government and the IAEA and others in trying to deal with that problem.

But on the first three that you list, the perception of unsafe, that public perception is very troublesome and we have done a lot of public opinion surveys, both for the industry and in individual com-

panies such as our own. And we find that to a great degree the public is probably more receptive to nuclear power than we tend to think.

We hear adversaries, but our polls for the industry show that a considerable majority of the American public are either (1) supportive of nuclear power or (2) accept the necessity for it. That does not mean they necessarily are happy or supportive in the sense of wanting it, but they feel it is necessary. And that majority is up in the 65, 70 percent area as a total, and in our own service area we find somewhat similar results.

But the public depends to us—again to the point Dr. Buckman makes about internal things that we can do. Safe operation of our existing plants is one thing that we simply must do, and I think we can take some pride in the fact that over the last 10, 11 years since the 1979 Three Mile Island accident that our safety record has greatly improved, and that is a must if we are to continue to enjoy public confidence.

And I think the same thing is true in some of these others. Cost effective, as Dr. Buckman says, first of all you have got to get a license and be able to build it to operate it effectively, and if you cannot ever get it into operation it is never going to be cost effective.

Some of these design problems can be internal to the industry, more nuts and bolts, but they are very important. But I think you are on target, and certainly waste, we have got to have a solution to that, and that we need your leadership in.

Senator WIRTH. Senator Wellstone, if you want to jump in here, please do.

Senator WELLSTONE. First, let me apologize to the panel. If I dash in and out, it is not a lack of interest on my part, let me just tell you that.

A couple of questions, Mr. Chairman. I accept the spirit of taking a look at a variety of different options, nuclear power included. But I have a couple of questions.

I would like to ask you this, Mr. Chairman. We need to deal with some of these questions, which are really not the technical questions, but are the questions that must precede the technical discussion.

In all due respect to an excellent panel, six out of the seven witnesses today have come in to make the case for nuclear power as being a part, a big part, of our energy future. Only one comes with objections. If we are going to deal with these issues, I for one, would like to see a fuller discussion and a fuller range of views at our committee hearing.

Second of all, I would like to carefully examine some of these questions, like cost effectiveness. We heard some interesting testimony from PG&E last week. They did not assume that they were going to have to build new power plants and the only question is whether it is fossil fuel or nuclear. In a State where there used to be a tremendously rapid rate of increase in demand, they decided they were going to focus on reducing demand, that that was more cost effective. They have leveled their demand off. They have no plans to build any further plants in the next decade.

I would like to see a rigorous study which would compare these two paths. Is nuclear power more cost effective than reducing demand. I do not know if you have those figures that you can present to me or someone can, but I certainly would like to get some rigorous analysis about this question of cost effectiveness.

Then a second question, just to lay it out if I could Mr. Chairman, pertains to the problem of "perception" about the safety. I am not convinced that reducing the public's opportunity to have input and to raise questions about health and safety issues with nuclear power plants is a way, is a very positive way of dealing with that problem.

I think we are going in the wrong direction when we decide that the public should not have an opportunity to be heard on significant new safety-related developments that were not considered previously in the hearing process?

I do not think we are doing much to increase people's confidence when we are actually reducing their participation in the hearing process.

Senator WIRTH. Well, I know that the chairman welcomes input from all Senators, from witnesses and so on. And I think one of the things you will learn about is, you watch witness lists and you know when hearings are coming up, and you do like Senator Shelby has done: you get your very distinguished president of your utility to be testifying before the Energy Committee.

Senator SHELBY. If the chairman would yield, I would just like to tell Mr. Farley and others that the planes do not run on time. I left Alabama at 5:40 this morning and if I had had a direct nonstop jet flight I would be here, Joe, I would have been here earlier.

Thank you.

Senator WIRTH. Well, we were just having a terribly destructive conversation with the Alabama utility, but we will strike all of that.

Senator SHELBY. Well, I would not know why. You know, they are probably, if not the best, one of the best-run, not only from the standpoint of safety, but efficiency, in the country. And that is why we have got Joe here today.

Senator WIRTH. Well, we have enjoyed having Mr. Farley here today.

Mr. Wolfe, you have wanted to.

Senator WELLSTONE. Maybe I could get a response.

Dr. WOLFE. I have a couple of comments. Let me hit Mr. Wellstone's comment first. I do not think anyone argues about efficiency. I live in California. I have some doubts about PG&E's program. My bill is going to go up as a result of their program, I might say.

But nevertheless, I think all of us agree that we should be going after efficiency. What we are proposing here is not to stop efficiency, but to take away impediments to nuclear power that make no sense, so that we will have the ability to put nuclear power on the line if it is needed. At the present time we do not have that ability because of the institutional constraints I mentioned in my testimony.

Secondly, with respect to public impact, impact on the regulatory system, the proposals that we have is that there be complete public input, but that once we get a license and the plant becomes under

construction we do not allow opponents of nuclear power to use institutional means to delay it for non-technical reasons.

The Nuclear Regulatory Commission and, I might say, the nuclear industry does not want and none of us can afford to have non-safe plants operating, and anyone who really brings up a technical issue, it would be absolutely irresponsible, and you do not need legislation, for the Nuclear Regulatory Commission to ignore real technical issues whenever they come up.

But what we want to prevent is taking advantage of the institutional way we are doing things to unnecessarily delay for legal purposes, not technical purposes, not safety purposes, the start of a nuclear plant.

I have one more comment, on nonproliferation. I want to make a point, that nuclear power in this country, the Atomic Energy Act, President Eisenhower's Atomic Energy Act of 1954, was aimed at nonproliferation, that nuclear power in fact has been a major force in the world in preventing nonproliferation; that at the time of the act in 1954 there were some 40, according to Congressional testimony, some 40 programs throughout the world to develop nuclear weapons.

The nuclear program developed with the IAEA where nuclear technology was exchanged by those who had the technology to those nations that did not, in return for assurances that nuclear power would not be used for weapons purposes. And it has been amended since, the agreement, so that there are some 140 nations now who agree that they will allow inspections of their Nation so as to show that there are not weapons programs going on.

So I say that, first of all, nuclear power has been a very constructive technology to change the whole view, to change the whole situation with respect to weapons. And secondly, let me say that with present technology these days, I think that the probability of getting weapons from nuclear power plants is very small. There are other ways to do it, unfortunately.

Thank you.

Mr. FARLEY. Mr. Chairman, might I comment on Senator Wellstone's, one of his points relating to the public hearing and the emphasis on public hearings and public participation? I do not believe any of us here want to leave the impression that we are opposed to the public having input into the licensing process and into the continuing regulation through the NRC of the nuclear industry.

Our problem is that we can see several express examples of plants that have been finished and investment made in those plants and they have been held up literally for years and years by hearings on issues that could have been addressed up front.

Now, if a new question comes up concerning a new safety issue, that new safety issue could well apply to the existing 112 units that are already in operation, and our feeling is that if you have design certification up front, you have had hearings on emergency planning, you have tested out the safety of the site, the earthquake potential, all of these things, and you have got that out of the way up front, then you have built the plant in accordance with the predetermined acceptance criteria of NRC, and it has inspected you as you have gone along, and then you have finished, then in our judg-

ment you are really in the same position as those 112 units that are already out there.

Now, the NRC can call a hearing today under existing law on a new safety issue at any one of those plants right now. It can do that and it can order them shut down right now, and we are not trying to say that there is anything inappropriate or out of order about that.

But what we are saying is that a licensing process that has full public input, with all the predetermined concepts that enter into it, then when you finish there should be a very high threshold before somebody can come in and simply say: Hey, I have got something new; do not operate it. Now, if that is an issue that needs a hearing, but the NRC finds no problem in looking at it, let the plant operate and hold hearings, just as it can hold hearings now on any issue that comes up.

The problem, as several witnesses have addressed it, is being held hostage once you have made the investment on issues that may well turn out to be of not great import. But let us not be looked at as being opposed to public participation in the process. It is the order and the scheme of how you go at the hearing process, the licensing and the operation, and the NRC surveillance.

We depend on the NRC surveillance as a basic part of our operating our plants, and we need that to continue, and it has built into it continuing opportunities for public input.

Senator WIRTH. Let me just ask you, if I might, ask you a question about the safety issue—we have been joined by the distinguished chairman of the full committee. Senator Johnston, did you want to make a comment or a statement or whatever? We are in a broad discussion about this.

The CHAIRMAN. I will wait my time.

Senator WIRTH. Just a final point. We are talking about the safety issue. Is the safety problem the concern that you get to a Chernobyl meltdown situation? Is that a layman's summary of the safety problem?

Mr. FARLEY. This is just a personal perception. I think that the public has read a great deal about the several events that have happened, Chernobyl being the one at which people were hurt and people were killed. Three Mile Island, no injuries.

Senator WIRTH. I understand. Is that the problem? Is that the safety problem?

Mr. FARLEY. I think that there is a public perception that there is something dangerous.

Senator WIRTH. Let me ask you, is the safety problem whether or not—excuse me, but is the safety problem the question of a meltdown? Is that the problem we talk about? Leaving aside the public perception, is that the technical problem?

Mr. FARLEY. To me that is not a problem. I do not think the plants are unsafe in any way. I think it is the perception of safety that is the basic problem. I think the plants are safe, and Dr. Wolfe can comment a lot more on that.

Senator WIRTH. Is it then the perception that there will be a meltdown, is that it?

Mr. FARLEY. Yes, I think it is the perception.

Senator WIRTH. So therefore, if you could eliminate, if you could say to people, there cannot be a meltdown, does the safety problem go away or most of the safety problem?

Mr. FARLEY. Well, you know how to deal with the public better than I do, Senator. But I think there are several things that would make it go away. One is the continuing safe operation of the existing plants. People get to feeling better about the technology.

Another thing is the identification in the advanced designs of whatever sort we have been talking about this morning—all of them have in them better safety features. But the public is not, I do not think, reassured by any one particular thing. I think the public develops a feeling about a technology over a period of time.

I do not think there is anything we can do tomorrow that will change all of the public perception or public concern. I think it is a process that includes several things we have been talking about to get that perception changed.

Senator WIRTH. Dr. Kadak.

Dr. KADAK. As I would characterize the safety problem, it is the release of radiation from an operating nuclear power plant. It is not any particular event or circumstance. It is just what happens if radiation is released, and I think the public is concerned about what that means to me personally. That is the safety problem I think the people are relating to, and it is our job to make sure that that does not happen or the likelihood of that is very small.

Senator WIRTH. So that if we are in the process of attempting to identify technologies, we want to identify that technology that is going to be the least likely to have any releases?

Dr. KADAK. To do that.

Senator WIRTH. Is that the standard that we ought to be setting, Dr. Buckman?

Dr. BUCKMAN. I have some concern with that characterization. I agree with Dr. Kadak that the safety problem is the release of radiation and that it is generally characterized as being a concern with core melt, because core melt is that event which leads to a large release of radiation.

We have technologies today in which the likelihood of core melt is very low, and there has been a great deal of argument about how low is low enough, what probability is acceptable and what is not. It is my belief that if we go to technologies in which we simply take a very unlikely event and make it more unlikely, that we will not have dealt with the fundamental question, and that is there are a lot of people who do not care whether it is very unlikely or very, very unlikely or very, very, very unlikely; that we have to come up with a technology where we say it will not happen.

Senator WIRTH. The public is saying you have to come up with a technology and you are saying that that is not possible, is that right?

Dr. BUCKMAN. No, I am not saying that that is not possible. I am saying that that is difficult. That is the challenge and that will be the challenge for this industry for quite some time.

Senator WIRTH. You were advocating earlier a gas-cooled reactor, is that correct?

Dr. BUCKMAN. Yes.

Senator WIRTH. As the one that you think will be least likely?

Dr. BUCKMAN. It may very well fall into the category of "cannot happen." I do not think we are far enough along in the technology today to know for certain, but I believe that is the candidate, of those candidates being examined, which is most likely to fall into the category of "it cannot happen, period."

Senator WIRTH. My time is much more than expired. Senator Wellstone.

Senator WELLSTONE. Senator Johnston.

Senator WIRTH. We are doing this quite informally.

Senator WELLSTONE. You mean I can even go ahead of him? Whoa.

[Laughter.]

Senator WELLSTONE. Go ahead. I am sorry, Senator Johnston.

The CHAIRMAN [presiding]. First of all, gentlemen, I want to apologize for my flight yesterday. I spent 7 hours in a very small airport and spent the night in Miami. I would rather be talking nuclear reactors with you.

Now, first of all, on new technology, the HTGR as it is explained to me by its enthusiasts not only it might not be able to happen, but is scientifically incapable of a meltdown because its design high temperature without coolant, if I recall, is something like 1,700 degrees.

Dr. Wolfe, I think you are a particular scientist on this, and you may not be an enthusiast for the HTGR. But is that part correct?

Dr. WOLFE. Well, I think that the HTGR has very attractive features.

The CHAIRMAN. Is that one of them?

Dr. WOLFE. That its temperature can be up in the 1,700 degree range? Yes.

The CHAIRMAN. That means it is incapable. It is what they call inherently safe?

Dr. WOLFE. I do not think anything is inherently safe, in that the imagination, one's imagination can invent ways in which one can distribute radioactivity. That is my feeling.

The CHAIRMAN. Well, a meltdown, how would the meltdown happen at 1,700 degrees if that is below the——

Dr. WOLFE. Well, I do not want to get into the details, but I think if you let me—and I think the gas reactor is a very attractive concept. And let me make three points. One, to Mr. Wirth's point——

The CHAIRMAN. Well, can I just get a straight answer to this question? Is it capable of a meltdown, yes or no?

Dr. WOLFE. I think you will find ways in which you could get large releases. If you allow your imagination, you can get large releases from the gas reactor.

Let me just make my——

The CHAIRMAN. Mr. Wolfe, it is a simple question. Do you know what a meltdown means?

Dr. WOLFE. Yes, I know.

The CHAIRMAN. Is it capable of a meltdown?

Dr. WOLFE. I have not looked in that much detail recently at Dr. Buckman's design.

Let me say, Mr. Johnston, I am in favor of the gas-cooled reactor. I have gone through this business, I have been in this business since 1955. I can outline to you some 30 different reactor systems:

the organic cooled, the heavy water, the heavy water-organic cooled reactor, the heavy water gas-cooled reactor.

The CHAIRMAN. Well, I was going to get into those.

Dr. WOLFE. And I am saying the problem that you have is that when you get into the details of these reactors, as we showed even at Fort Saint Vrain, that sometimes the practicality of building them overcomes their initial promise, and that is what concerns me with the gas-cooled reactor.

So the idea that we should abandon the light water reactors in favor of something out there is a mistake in my opinion. That does not mean we should not pursue the gas-cooled reactor, but I think it is a mistake to argue we have the solution out here and we should abandon those.

Let me say, in the light water reactor and the advanced boiling water reactor, we have designed it so that even if there is a meltdown, even if there is a meltdown, the offsite dose to people will not produce any noticeable medical effects.

The CHAIRMAN. Dr. Buckman, you do like the idea of the HTGR?

Dr. BUCKMAN. Yes, I do.

The CHAIRMAN. And are you involved in the design of that at all?

Dr. BUCKMAN. No, I am not.

The CHAIRMAN. Why do you like it? I am sorry if this is somewhat repetitious.

Dr. BUCKMAN. It is not repetitious. There is not as much disagreement between me and Mr. Wolfe as it might sound. I am supportive of pursuing the advanced light water reactor designs on kind of a near-term basis, because we have not built in this country an MHTGR that is like the concepts being put forward today.

I like it because it meets—I believe the criteria in the Senate bill are appropriate criteria for advanced reactors. I believe the MHTGR does the best job of meeting those criteria of any design that I have examined, and I believe that we should as a Nation provide significant support to pursuing that design.

The CHAIRMAN. Well, I do not want to make it sound as though I have decided on that we ought to do an HTGR. There are competing designs and actually the bill calls for two levels: first, what you might call the next leap forward, the mid-sized AP-600 type design, which I think we clearly ought to do. It is a step forward. It is not as advanced as some newer designs, but I think it is safe enough. I think existing light water reactors are safe enough, certainly by any standards of comparison to any other technologies.

But is the mechanism that we provide in the bill a workable mechanism for having scientists decide on what to do?

Dr. BUCKMAN. The way I read the mechanism, the next step is design, certification and construction of an advanced light water reactor for all intents and purposes, and that there is a follow-on in, I think it is, section 12006 for the certification and construction of a newer design.

In my own way of looking at this, I think that what would be appropriate is to consider one of the ALWR's or perhaps more than one, but certainly one of the ALWR's for that next step, for this near-term step; and that what is appropriate is to pursue the MHTGR in that longer term view, that the technology for an

MHTGR today is not at the same level as it is for the light water reactors.

I agree that today's water reactors are safe enough, that the ALWR's are safer, and I think that the MHTGR has the opportunity, although it has not proven it today, to take it a step farther and say that some of these things that we worry about with light water reactors simply cannot happen. But we have not demonstrated that today.

The CHAIRMAN. Well, the mechanism, the discipline which is provided in the bill, whereby the scientists, the people in DOE, will decide and pick a winner or maybe decide that there is no winner, is that mechanism workable, laying aside the question of whether the technology is mature enough, whether it involves, as Mr. Wolfe says, the scrapping of light water reactors. By the way, I do not believe it would eliminate the light water reactor.

But is the mechanism workable?

Dr. BUCKMAN. I believe it is.

The CHAIRMAN. Why is it not now time to determine whether or not we can decide on a new technology for the next generation of reactors?

But is the technology so undeveloped that we cannot as a country, as a DOE, decide on what the proper winner is or decide that we cannot decide at this point? Mr. Farley?

Mr. FARLEY. It seems to me, Senator, that your point is well taken, that we need to be looking toward the next generation of technology. The concern that I have is that I see for this Congress and the country a limited amount of resources everywhere you turn. You are under that pressure constantly for appropriations for this or that.

My priority, looked at from our company's point of view and hopefully from our industry's point of view, is I think we have got a winner going with the advanced light water reactors that are being supported now in the design certification stage and that will hopefully be supported in first of a kind engineering. And that is all near term and requires some appropriations from the Congress and some participation by us in the industry.

That is to me the critical need for moving forward.

The CHAIRMAN. Now, we do not have money in this for demonstration or construction of an advanced light water reactor.

Mr. FARLEY. Yes, sir. Yes, sir, but I know that DOE is seeking appropriations for next year for these kind of things that I mentioned. What I am concerned about is only the fact that, if I had to choose between the money for one and the other, I would choose to move forward with what DOE is doing now and hold this for when we have got the ALWR ready to go, which I hope will be about 1995 or 1996.

Then I think there will be movement. And I think we must move toward the HTGR or the liquid metal reactor. They are both things that can do a better job, in all likelihood, out there in the future.

My concern is one of priorities, in that I see what I believe to be a winner almost there and I do not want to divert attention from getting that job done.

The CHAIRMAN. Well, that process is iterative. I mean, we have in mind first the LWR and then the more advanced technologies.

But you think we need money for the ALWR. How much money and what kind of mechanism?

Mr. FARLEY. The DOE appropriations request—and I realize Mr. Young will be testifying here after I and this panel are finished, and I realize that you are not the appropriation, this committee is not the one dealing with that. But they are looking for—let me see. The number I believe is $112 million for this year. I think $112 million is in place for this year.

They are seeking roughly an equivalent amount next year. That will include not only continuance of the design certification process, but also funds for participation in first of a kind engineering. And they are looking to the vendors and to the utility industry to participate as well in that first of a kind engineering, which is the last phase leading up to when it is ready to go, for somebody to order off the shelf.

So that is roughly the magnitude of the dollars.

The CHAIRMAN. When would you see roughly $224 million?

Mr. FARLEY. This would probably continue. I believe Mr. Young can do a better job than I can without a little fumbling here, but that would continue over the next 2 or 3 years until we get to the point that the design certification is ready and the first of a kind engineering is done. That hopefully will be by the 1994-1995 time frame at NRC.

And DOE will have been participating during that time.

The CHAIRMAN. But you say that after that private industry would be willing to do it?

Mr. FARLEY. Yes, it is my belief, and I really do believe this, that once that certified design is there and once we have in place a licensing process that will work, as you discuss in title XIII, and we have done something about the storage of the high level waste, which is a serious concern to our customers, to the American public, I think once we have got those things in place, then I believe it will sell in the marketplace.

The CHAIRMAN. So we are talking about the total figure being a quarter of a billion dollars, roughly that order of magnitude?

Mr. FARLEY. It would go over several years, so it would be perhaps a bit more than that, but with some private sector participation. In fact, the total dollars, including from participation from others, such as vendors and ourselves, would probably exceed that $250 million. It would be something more than that, but perhaps not a great deal more.

Dr. WOLFE. Could I? Mr. Johnston, you and I have been together for a number of years and usually agree, and let me just answer your earlier question directly, Senator Johnston, so that I do not seem to be ducking it. If you give me the design of any reactor, including an advanced gas-cooled reactor, give me the design and I can find a way to melt it down for you.

Probabilities may be way out there, but I believe that I can find a way, given any design. Mr. Farley put the situation much better than I did in terms of perspective. What I am really saying, and I agree with him, is that the light water reactors in my view represent really a step forward in safety and represent, compared to any of the other technologies, a safe technology, and I do not want to see that threatened.

The CHAIRMAN. Well, I understand. I understand that. I had been told that it was inherently safe. It may not work, but it is inherently safe.

[Laughter.]

Dr. WOLFE. It has great safety features.

The CHAIRMAN. It cannot melt down. But you are saying it can melt down, and I will talk to the other side and see what the answer to that is.

Senator WIRTH. Mr. Chairman, we have a number of Senators here and we probably ought to return to recognizing people on the basis of when they arrived. The chairman, always being here, was of course recognized first.

Mr. Wellstone, then Mr. Shelby, then Mr. Craig.

Senator WELLSTONE. Senator Wirth, rather than asking a lot of questions, I am anxious to hear from others yet to testify today. So let me just go back to some of the questions I raised earlier.

Right now as we look to our energy future in the United States, it is clear that as a part of that energy strategy there are serious proposals to build and to site several hundred nuclear power plants. That is what is being proposed in the National Energy Strategy. Since that is the case, I have several questions that I do not feel have yet been answered, that need to be answered, questions dealing with cost effectiveness.

I go back to PG&E and I really want to see some clear data. I want to see some comparison. I want to see a rigorous analysis, I want it to be empirical, that shows me that the nuclear power path is in fact more cost effective than reducing demand. That is not what PG&E came here and told us.

Second of all, I really appreciated, Mr. Wolfe, your very honest remarks. I am a lay person. I do not know nearly what you know. I admit that. I have been teaching for 20 years and I always say to students: If I do not know the answer to a question, I just say so. There is much for me to learn.

But to my way of thinking as a lay person, there is always human error. I am skeptical that there really is a technical fix. Is there really a technology that could guarantee every citizen in our country—we are talking about siting a lot of plants—that there is not going to be any serious problem?

I question this. And I go to the last point. I know that the NRC at any time can order a hearing or investigate, but if we are worried about the "perception" that people have, I would not want to cut down on the citizen participation part, where before a plant becomes operational, citizens have the opportunity to raise concerns that could not have been foreseen earlier.

I see the problem of obstruction, which is what you have talked about. But I also see the other problem.

So let me just raise those questions, and move on, because I really do want to make sure that before I leave at noon I get a chance to hear from everyone.

The CHAIRMAN. Senator Shelby.

Senator SHELBY. Thank you, Mr. Chairman.

I missed a lot of your testimony, but I see the whole process is, are we going to streamline the licensing procedure? How do we do

it? Because without the streamlining of the licensing procedure, who is going to build the power plants in this country?

Mr. Wolfe, you said that you could find many ways to cause a core meltdown, I suppose it is. I guess you could also look at the safety features that have come about probably since 1979, Three Mile Island. But are you going to fly an airplane and try to fly it safely or are you going to crash it intentionally? Who knows.

But if we are going to move into a new phase of nuclear power plants, we are going to have to look at the positives and the negatives. We are very aware of the perception and public fear of nuclear power plants, meltdowns, the other things that are associated with it.

But how do we deal with that? Do we deal with it just with new technology, you know, new design, or is it going to take a combination of that plus allaying the public's fears, including the Congress to streamline the licensing process? I see a multifaceted thing.

Do you want to comment?

Dr. WOLFE. Yes. Thank you, Mr. Shelby. Thanks for the opportunity of making it clear that I believe that nuclear power plants as designed, the light water plants and the gas plants, represent such high degrees of safety that in fact relative to other sources of energy or lack of energy they represent the safest way to go.

Senator SHELBY. And much safer than they were.

Dr. WOLFE. You missed my testimony.

Senator SHELBY. I did.

Dr. WOLFE. But much safer than they were. And as I have mentioned, we have got them designed now, in the case of one reactor, where even if there is a meltdown it has no effect on the public.

When we do the analysis of safety to the public, we find, instead of the present regulatory requirement of one in a million to have effects at the site boundary, these plants now have probabilities of 1 in 1 billion. And relative to other means of producing energy or lack of energy, I think they represent the safest type of generation out there.

Senator SHELBY. Also a lot of pluses for our environment.

Dr. WOLFE. And certainly the environment and the greenhouse effect we have gone through. Without nuclear power, I do not think you can keep the greenhouse effect under control or stop it from going out of control. So I think it represents environmentally and safety the best approach for the American public.

I think that the American public, incidentally—and there is indication they are moving in favor of nuclear power, to Mr. Wirth's question that he asked before. Up until now there has been no need for nuclear power or for coal plants or for gas pipelines or anything. We have reached the point now where there in fact is a need for new power, and that is where I think the public, when it has to face the question of do I want my lights to go on or do I want a coal plant or a nuclear plant or a new dam, I think there is the place where we are going to see nuclear power come back, recognizing that there is no technology or lack of technology that does not have some risks or some possibilities that people do not like.

Senator SHELBY. But it is not ever going to come back until we streamline the licensing process, and that has got to come with designs, the enhancements, or whatever incorporating safety.

Dr. WOLFE. Mr. Shelby, that is absolutely right, and I think it is a disgrace for this country to have nuclear power not held up for real reasons and not for safety reasons or not for lack of public input, Mr. Wellstone, but by having just a bureaucratic system that allows anyone who wants to stop a nuclear plant to do it. That I think is a terrible black mark on our whole institutional system.

Senator SHELBY. Joe, you want to say something?

Mr. FARLEY. Senator, just that I agree with you that there are several building blocks without which it just simply will not happen, and I think first on the list is licensing reform and a sensible procedure that protects the right to public input.

Senator SHELBY. Without licensing reform, you will not attract people to even consider building new nuclear plants, will you?

Mr. FARLEY. No. We could not go to our board of directors and ask them to approve going forward. I do not think the financial world would——

Senator SHELBY. Would finance it?

Mr. FARLEY [CONTINUING]. Would finance it. I do not think the State regulatory commission would give us a certificate of convenience and necessity. I think we would just be stopped before we ever got started without the licensing reform.

Senator SHELBY. In your State of Alabama, you have two units there.

Mr. FARLEY. Yes, sir.

Senator SHELBY. Basically, how long has the first unit been operating and the second?

Mr. FARLEY. The first unit went on line in 1977, the second in 1981.

Senator SHELBY. Have you had any major safety problems?

Mr. FARLEY. No, sir, we have not. We have had the usual problems that accompany any kind of an industrial process, but they have operated very well and very safely.

Senator SHELBY. You were concerned about title XIII, the language there.

Mr. FARLEY. Yes.

Senator SHELBY. Would you, and others on the panel, too, if you are interested in that, and I think it goes to the central part of it, would you furnish some suggestions for the record, testimony to the record, as far as clarifying language?

Mr. FARLEY. Yes, sir, we would be glad to do that. We would look forward to doing that.

Senator SHELBY. Do you have any comments on core meltdown or anything else, or does that about cover it?

Dr. KADAK. If I could, I would like to respond to Senator Wellstone's comments about conservation and evidently the mutual exclusivity of it. We, at least our utility and I think most people in the utility business, believe that you do not need to focus all your efforts on conservation and ignore the demand side.

What we are proposing here is a balanced approach. Whatever you can get out of conservation—and there are a lot of aggressive utility programs out there—that is great. But do not ignore for the sake of the conservation ethic the ability to construct additional power plants, of whatever type.

I am afraid the "on the one hand and on the other hand," the battle, the lines that are trying to be drawn here, are unnecessary, because you will get no disagreement from this panel and I am sure from most utility executives that there is a disagreement. We need to do both and both are very cost effective.

If the energy projections of the forecasts are correct, without aggressive conservation we are not going to have sufficient electric supply. My parents live in Florida and already they told me that within the last 2 weeks or so they had rotating blackouts. Now, that is not a way to live in this country, in my opinion.

Senator SHELBY. I would yield.

Senator WELLSTONE. I appreciate that comment. I am all for the dialogue and the discussion and not for essentially presenting these alternative as that they are "mutually exclusive."

I am simply saying one more time that I want to see a serious discussion about that whole question of saved energy and other sources of energy. And I have not seen, again, sort of where that fits into the overall strategy, and that is really what I am trying to say today.

On cost effectiveness, the other part of it is I do not know about cost. I do not know how much already in terms of subsidies has gone into the nuclear power industry, what this would cost. I mean, it is enormously capital intensive, and I think those are real important questions as we try to decide to what extent we pursue this path.

That is what I am trying to get at. That is what I am trying to get at.

Senator SHELBY. Mr. Chairman, could I ask one other question?

The CHAIRMAN. Yes.

Senator SHELBY. It may have been covered earlier. What are the positives of a common design, uniformity? Is it stagnation as far as thinking is concerned? I would be interested. Joe, you want to answer that?

Mr. FARLEY. A common design just offers very, very many advantages, ranging all the way from ease of construction because of known ability to replicate what has already been done, the ability to warehouse and acquire spare parts, the ability to train operators, to operate common control room features, just very, very many things. Maintenance. I could give a long list.

I think the French have demonstrated that with their standardization. And bear in mind, they do not have just one identical unit. They have families of units that are of a certain size and then larger ones. But they have been able to achieve a great many economies in operation and all the things that go with it from construction on by virtue of that standardization.

It just offers a great deal of economy, of efficiency of operation, efficiency of training, and with that I think an ease of safety and of monitoring safety.

Senator SHELBY. And it would save probably billions of dollars, would it not?

Mr. FARLEY. Yes.

Senator SHELBY. What is the down side?

Mr. FARLEY. In the past, our industry went the way it did—and I say this perhaps a bit defensively—because, number one, the anti-

trust laws prevented the utility industry from trying to gang up and pick one design. Similarly, our PUC's all want competitive bidding, and there was a feeling that there was not any real problem with going our separate way.

I think by hindsight we would have tried to do more in the way of standardization. I think the French have shown what a success that can be, and I think we can do equally as well in the future.

Senator SHELBY. Do you have a comment?

Dr. BUCKMAN. I wanted to add one advantage to standardization to the list. I agree with everything that Mr. Farley said and would point out that, in my view at least, one of the more significant advantages is the extent to which it simplifies both the regulatory process and the continuing regulatory interaction.

You have a regulator who has fewer designs to deal with and can understand the designs better, can also apply issues from one plant to another plant in a much more straightforward way than when each plant is custom designed.

Senator SHELBY. It could be central to the whole streamlining of the licensing process, in a sense?

Dr. BUCKMAN. I think it is an important part of the streamlining of the licensing process.

Senator SHELBY. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Craig.

Senator CRAIG. Thank you very much, Mr. Chairman.

To the panel, I was unable to be here for your testimony. I will read it and consider it carefully.

In looking at the legislation that you have before you as an industry and the legislation you will soon have before you—by that I mean the committee's work of S. 341 and that which will be sent forward soon by the administration—assuming all of those things that I think we now accept as we had better get done if we are going to have a nuclear industry in the future, streamlining of licensing, the question of safety as it relates to the handling of wastes, and all of what we have worked on over the years to try to make that happen, as someone who has not been bashful at all about being supportive of the industry, as I am, does S. 341 or the legislation as you understand it from the administration do enough in the area to promote advanced reactor design in the way the industry would like to see it if we are true in our goal to achieve a standard mix, if you will, in the market basket of energy for the future that allows nuclear to be a part of it?

Any one of you?

Mr. FARLEY. Let me say that I guess I have a lawyer's background and no statutory language ever entirely satisfies one lawyer if another lawyer wrote it.

Senator CRAIG. Well then, that disqualifies you, if you are an attorney, Mr. Farley.

Mr. FARLEY. Good reason.

But I think that there are some refinements certainly that we think would be helpful to it, though we think the basic structure and intent of title XIII is right on target. We have some suggestions. As I indicated to Senator Shelby, we will furnish those to the committee.

I think in the case of title XII that we are addressing, I think title XII is fine, and the only reservation that I had, as I was attempting to express to Senator Johnston, was that I want to be sure that DOE's ongoing program with the advanced light water reactors continues, and I do not see that they are mutually exclusive. That is a matter for the Congress to determine.

But I think the bill is very much needed and, with the refinements, they are really all that I could add to the question. Certainly the nuclear waste problem is a very serious one and I think our program will again not go forward unless there is on track a provision or somehow a mechanism for the ultimate storage of the high level wastes.

Senator CRAIG. Dr. Buckman?

Dr. BUCKMAN. I think that S. 341 in large part addresses what is needed with regard to advanced reactor technology and development. In my testimony I did make one additional recommendation, which I think in the area of the MHTGR would be extremely helpful, and that is to combine the technology development that is necessary for commercialization with the need for an NPR, a new production reactor, and then by going forward with a gas-cooled production reactor we could in effect kill two birds with one stone.

I think that would be extremely helpful, not only to the industry but to the country. With that one addition, I believe that the bill is not only in the right direction, but does in effect the right things.

Senator CRAIG. Let me ask of you: Part of the concern we have, assuming we can do all the right things, is then the question of perception: Will the public of this country allow us to go forward? And that is darn critical, as I think all of us have seen over the years.

Part of that perception is that we have done something different and it is better, and better means safer. Do you believe that there needs to be, in relation to the differences between the sections of the proposed bill especially, S. 341, where I believe there may be a slight bias toward ALWR versus high temperature gas, do you think that there needs to be a more level playing field toward the advancement of that design?

Dr. BUCKMAN. No, I do not, and I guess I do not think that there is an untoward bias toward ALWR's. In my view, the natural progression to take if we want a truly robust nuclear option for our energy future in this country is to proceed on a relatively rapid basis with certification and deployment of ALWR's; that because of the need to continue in the development of technology that the MHTGR is going to follow, I believe that that is what is anticipated in the proposed bill, and I think it is appropriate.

Senator CRAIG. So you suggest and are confident that it is a progression that is necessary as it relates to technology and advancement in these designs?

Dr. BUCKMAN. I think it is progression that is necessary, and I think it is necessary for two reasons. The ALWR was earlier characterized as the leading candidate and the one that is closest to the finish line, and I believe that to be true. I am concerned that there is some probability, albeit probably a small probability, that the ALWR may not make it to the finish line.

So that I think it would be unfair and inappropriate to drop the MHTGR as an option today. I think that the MHTGR offers a great deal of long-term potential, but it needs to be developed. As it is developed, it may not play out, and so I think it would be equally unwise to today drop the ALWR in favor of the MHTGR.

I think they need to be pursued in parallel, on different time scales, and with the recognition that the ALWR is farther along today.

Senator CRAIG. Do any other of you gentlemen wish to comment on that question or that general area?

[No response.]

Senator CRAIG. Thank you all very much.

Mr. Chairman, I have no further questions.

The CHAIRMAN. Gentlemen, thank you very much for your testimony.

Our next witness will be William Young, Assistant Secretary for Nuclear Energy of DOE. Please proceed, Mr. Young.

STATEMENT OF WILLIAM H. YOUNG, ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY

Mr. YOUNG. Mr. Chairman, I am pleased to have the opportunity to discuss DOE's views on titles XII and XIII of S. 341. I will present our views in the context of the National Energy Strategy, which we recently delivered to the Congress, and the proposed National Energy Strategy Act, which was delivered yesterday. I will also try to interject into my remarks some comments on some of the discussion that has been going on.

Before I do so, I would like to commend and thank the chairman and the committee for their leadership on behalf of a balanced energy policy for the United States and particularly their support for nuclear power.

DOE agrees with the overall objectives expressed in titles XII and XIII, to develop, construct, and operate advanced nuclear reactors to meet the growing electricity needs of this Nation. I understand that in marking up S. 341 you will consider the provisions of the National Energy Strategy and its associated legislation. My remarks today are aimed at enabling you to do so in an effective manner.

Title XII has three specific provisions that I would like to highlight and comment on to make sure we have a mutual understanding.

Section 12004 requires the Secretary of Energy to hold public meetings to obtain input on various aspects of nuclear power. It also requires the Secretary to submit to the Congress a plan for carrying out the purposes of this title, including establishing the need and timing for future nuclear power use.

Section 12005 provides for what might be called a demonstration of institutional arrangements necessary to proceed with a nuclear power construction project. This section authorizes DOE to solicit proposals for collaboration with one or more private parties, who would become applicants for the necessary permits for construction and operation of nuclear power plants. This section would also require DOE to indemnify the applicant against cost escalation due

to regulatory requirements imposed subsequent to issuance of a combined operating license.

Section 12006 authorizes DOE to issue a request for proposals within 450 days of enactment of S. 341 to provide for commercial demonstration of advanced nuclear reactor technology, which would include light water reactors, gas-cooled reactors, and liquid metal reactors.

Title XIII would augment the NRC's Rule 10 CFR Part 52 to limit the scope of a post-construction hearing and permit plant operation while a hearing was in process.

Let me first highlight some aspects of the process used in developing the National Energy Strategy and describe some of its features being implemented and some of the provisions of our proposed legislation. One of the foundations for the National Energy Strategy was a process of public consultation without precedent in U.S. energy planning. The public record established is the result of 18 public hearings, presentations by nearly 450 witnesses, and over 1,000 written submissions. More than 500 commentators addressed nuclear energy during this process. In addition to the public input, we received over 20 State Government energy plans.

This massive information collection effort was supplemented by thousands of hours of analytical work within DOE, which was then painstakingly reviewed on an inter-agency basis. The results were the detailed National Energy Strategy and a set of more detailed backup analysis documents which can be provided in order to add to the information now publicly available.

I think it should, therefore, be evident that DOE has already carried out an extensive public consultation process and has utilized the input received in developing a plan for presentation to the Congress. The National Energy Strategy chapter on nuclear power lays out a specific program for the future development and use of advanced design nuclear generating plants.

We believe that these actions and results satisfy and eliminate the need for the requirements of section 12004.

For nuclear power, as with other supply and conservation technologies, the National Energy Strategy will be implemented largely through actions that do not require legislation other than appropriations. Title V of the National Energy Strategy Act proposes needed legislative actions in two specific areas for nuclear power, nuclear licensing reform and nuclear waste management.

Several principles underlie the basic approaches described in the National Energy Strategy. They are:

First, to concentrate on removing undue institutional and regulatory obstacles to the expanded use of nuclear power and to establish an efficient process through which the private sector can build and operate new nuclear power plants on a safe and economic basis;

To collaborate with the private sector by cost-sharing to reduce the front-end risk of the expensive preparations for constructing new nuclear plants;

And to permit the free market to choose those technologies and designs desired to be built.

These principles will be implemented through the specific actions called for in the National Energy Strategy, which I will now de-

scribe. The strategy examined the need for expansion of nuclear power based on electricity growth, economics, energy security, and environmental considerations. We project that a substantial amount of new generating capacity, between 190 and 275 gigawatts, must be added between 1991 and 2010 to serve the Nation's growing requirements for electricity.

Let me just depart from the text for a moment here to note to Senator Wellstone that this amount of capacity needed is after a vigorous energy efficiency and conservation program. The National Energy Strategy for electricity strongly supports integrated resource planning and many other conservation methods that will avoid as much as 85 gigawatts electric of capacity needing to be built.

In terms of an integrated analysis of this question, I would invite you to examine both the National Energy Strategy itself and subsequently the analyses that back that up, because the mix of conservation and supply has been addressed very thoroughly.

As a result of these needs for electricity generation, the basic objectives established for nuclear power in the National Energy Strategy are: to achieve a first order for an advanced design nuclear generating plant by 1995; and to start operation of the first such plant by 2000. These objectives are shared by the private sector, as reflected in the strategic plan issued by the Nuclear Power Oversight Committee of the electric utility industry.

The National Energy Strategy defines a series of actions that will enable a nuclear plant to be ordered by 1995. In several instances, we have issued or will issue requests for proposals to select on a competitive basis private sector partners with whom we would share the costs of demonstrating some of the new features of the 10 CFR Part 52 licensing process and the risks of bringing new nuclear power plant designs to a point where they would be viable on the commercial marketplace.

Thus, through a series of actions or programs, we are already carrying out or planning the types of activities contemplated in section 12005.

The first such program is certification by the NRC of two evolutionary 1,300 megawatt advanced light water reactor designs and two passive 600 megawatt designs. The schedules for certifications of these designs are currently being determined with the NRC based upon the recent Commission decision on the level of detail required for certification, with which, after much interaction with the NRC, we are satisfied.

The earliest date for certification of an evolutionary plant would now appear to be 1993. Certifications of passive designs are targeted to be completed by 1995. Further, these certifications must be achieved so that future changes would not be needed except in exceptional circumstances, and thus indemnification against subsequent NRC regulation changes would not be required.

We do not foresee the possibility of a new nuclear power plant order until the 1993 to 1995 time frame. Therefore, any attempt to seek an applicant for a combined operating license under 10 CFR Part 52 would be premature at this time.

The second program, standardization of nuclear plant designs, is necessary if schedules and costs required for economic use of nucle-

ar power are to be met. We have included in the National Energy Strategy a DOE cost-shared program to complete first-of-a-kind engineering so as to achieve commercial standardization of at least one new nuclear power plant design by 1995.

We announced the commencement of this program in conjunction with the release of our fiscal 1992 budget proposal. We have had considerable discussion with the private sector regarding this future program and are pleased to see an emerging interest in private sector funding of the required design work.

Completion of this program is important to advance new nuclear power plant designs to the point where firm prices can be offered and sufficient certainty about costs and schedules can be developed to permit private sector financing and construction of such plants.

The manner in which this program will proceed and be funded in the future will depend upon the response we receive from the private sector, particularly the electric utility industry.

We have also initiated a third activity, an early site permit program to demonstrate use of the siting provisions of 10 CFR Part 52. We expect to receive a response to our RFP on this activity this year and to complete the program by 1995.

I have two overall observations regarding these programs. First, they represent our approach to the removal of undue obstacles to and reduction of the front-end risks of expanded nuclear power use. Our plan does not contemplate a formal DOE role in an application for a combined operating license or indemnification of added construction costs due to NRC regulation, even for a first new plant.

Unless the processes through which new nuclear power plants are built are sufficiently reformed so as not to require Government participation, the undue obstacles to nuclear power have not been adequately removed. We would expect to lend support and advice to prospective owners in matters such as financing, licensing, and State economic regulation, but not through direct Government participation, which would be an inappropriate role.

Second, our approach provides maximum flexibility for ultimate decisions to be made by the free market. In our work on these initiatives to date, we have found that such flexibility as private sector interests emerge is preferable to having the Government attempt to form through a procurement process a set of institutional arrangements to bring about the construction of a new nuclear power plant.

The fourth focus of the National Energy Strategy for nuclear power is the achievement by 1995 of suitable progress on high level nuclear waste solutions to enable a new nuclear power plant order. Such progress is required on characterization of the Yucca Mountain candidate repository site. Further, by 1995 we should have selected a monitored retrievable storage facility site and submitted a license application to the NRC, pointing towards first operation of an MRS facility in 1998. Evaluation of the feasibility of actinide recycle and the ALMR-IFR fuel cycle as a potential contributor to future nuclear waste management should also be completed by 1995.

Let me make several points also specifically regarding the commercial demonstration of advanced reactor designs. First, design certification and application of ALWR's does not require plant

technological demonstration, such as envisioned in section 12006, since advanced light water reactors are based on extensions of existing and proved technology and new features that will have been demonstrated by system or component tests.

Second, certification of ALMR and HTGR designs based upon completion of technological demonstration projects is estimated to occur by about 2005. By 1995, the nature of such technological demonstrations may be identified and established. Should an HTGR new production reactor be built, it is quite possible that a module of such a plant could be the basis for the technological demonstration needed to certify a commercial HTGR design.

I would just add the comment that we are actively looking at the use of an NPR-HTGR for that demonstration. It certainly is quite feasible, and in today's budget climate we think that potentially is a very effective way to develop that advanced technology.

The demonstration project for the ALMR is unlikely to be defined before 1995 and may well involve considerable international cooperation. I would say here, again adding to the text, that our view is not to compete one technology against another. Each of these three technologies does have a significant potential role in this Nation and we would look forward to, in a timing appropriate to each, to demonstrating them along the way.

All these considerations are reflected in the National Energy Strategy which has been provided to the Congress. Hence, we believe it is premature to contemplate in S. 341 a request for proposal for an advanced reactor demonstration project in the near future. Further, the ALWR should not be one of the candidates for such a demonstration.

Turning now to nuclear licensing reform, the NRC made important progress in that in 1989 by issuing 10 CFR Part 52. However, it did not completely eliminate the possibility of an adjudicatory hearing and possible procedural delays after a plant is completed. Further, in November 1990 the U.S. Court of Appeals for the District of Columbia vacated the provisions of 10 CFR Part 52 that relate to the post-construction hearing, observing that such reforms lie not with the NRC, but with Congress.

This court decision, though on appeal, emphasizes the need for a clear statutory basis for a fully reformed licensing process for new nuclear power plants.

Title XIII of S. 341 represents a major improvement in defining a fair, predictable licensing process. I will not comment on specific provisions of title XIII because the Department has submitted licensing reform provisions as part of its National Energy Strategy legislation. Our legislation builds upon 10 CFR Part 52. It contains provisions of the rule, requires resolution of emergency planning issues before construction, and eliminates the potential procedural delays of a post-construction hearing, while allowing valid safety issues raised by the public to be addressed.

Our bill strengthens the provisions of S. 341 relating to a post-construction hearing by requiring a showing before a hearing is granted that a nonconformance with the plant license would lead to lack of adequate protection of public health and safety, specifying a less procedural, informal hearing, assuring plant operation pending a hearing decision in cases where adequate protection is

not affected, and providing flexibility in handling licensing changes that do not affect safety.

We believe that the proposed licensing process of 10 CFR Part 52, as it would be modified by our legislation, will continue effective opportunities for public involvement in nuclear plant licensing. It will allow members of the public to make their views known on plant design and safety features, siting, and plant construction earlier than under the old two-step licensing process.

The public will continue to have the opportunity to raise valid safety issues at the completion of plant construction and during plant operation. The provisions of the National Energy Strategy Act will at the same time serve the overall public interest by requiring timely resolution of such issues and by limiting the opportunity for use of dilatory legal tactics by a small minority who would deny the benefits of nuclear power to the 80 percent of the American people who believe that it will be very or somewhat important in meeting the Nation's future electricity needs.

Based on studies DOE performed in connection with the development of the National Energy Strategy, we have proposed, in our act provisions that we believe will be sufficient to restore investor confidence and permit new orders for nuclear power plants. Accordingly, we recommend that the licensing reform provisions of that act be included in S. 341.

I indicated previously that an action essential to the revitalization of nuclear power is a demonstration of progress in the management and disposal of high level nuclear wastes. To accomplish this, I would note that DOE has proposed in its legislation two sets of provisions that are critical to the successful implementation of the Nuclear Waste Policy Act of 1982 under today's circumstances.

One set of provisions would enable DOE to carry out site characterization activities at Yucca Mountain in a timely manner. The second set of provisions would eliminate current linkages and constraints on the MRS facility, thereby allowing the MRS facility to start operation independent of progress on the high level waste repository.

Since a separate hearing will be held by this committee on the subject of nuclear waste management, I will not comment further on this subject or its relationship to S. 341.

Now I have some closing remarks, Senator, that I will just omit in the interest of time here and take your questions.

[The prepared statement of Mr. Young follows:]

PREPARED STATEMENT OF WILLIAM H. YOUNG, ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY

INTRODUCTION

Mr. Chairman, I am pleased to have the opportunity to discuss the Department of Energy's (DOE's) views on Titles XII and XIII of S. 341, the National Energy Security Act of 1991. I will present DOE's views in the context of the National Energy Strategy which we recently delivered to the Congress. Before I discuss the provisions of S. 341 and the National Energy Strategy, I would like to commend and thank the Chairman and the Committee for their leadership on behalf of a balanced energy policy for the United States, and particularly their support of nuclear power.

DOE agrees with the overall objectives expressed in Titles XII and XIII of S. 341 to develop, construct, and operate advanced nuclear reactors to meet the growing electricity needs of this nation. I understand that in marking up S. 341 you will con-

sider the provisions of the National Energy Strategy and its associated legislation that will be proposed shortly by DOE. My remarks today are aimed at enabling you to do so in an effective manner.

I will proceed as follows in offering specific comments related to the provisions of S. 341:

I will first summarize briefly some of the features of Titles XII and XIII upon which I will focus in the balance of my testimony.

I will next outline the process and results of DOE's development of the National Energy Strategy and point out relationships to S. 341. As you will see, some of the work that has been accomplished in preparing the National Energy Strategy will affect some of the features of S. 341.

I will identify some expected features of DOE's proposed National Energy Strategy legislation that should be reflected in a revised version of S. 341.

TITLES XII AND XIII

Title XII has three specific provisions that I would like to highlight.

Section 12004 requires the Secretary of Energy to hold public meetings to obtain input on various aspects of nuclear power. It also requires the Secretary to submit to Congress a plan for carrying out the purposes of this Title of S. 341, including establishing the need and timing for future nuclear power use.

Section 12005 provides for what might be called a demonstration of institutional arrangements necessary to proceed with a nuclear power construction project. This section authorizes DOE to solicit proposals for collaboration with one or more private parties who would become applicants for the necessary permits for construction and operation of nuclear power plants. The section would also require DOE to indemnify the applicant against cost escalation due to regulatory requirements imposed subsequent to issuance of a combined operating license.

Section 12006 authorizes DOE to issue a Request for Proposals within 450 days of enactment of S. 341, to provide for commercial demonstration of an advanced nuclear reactor technology. Advanced nuclear reactor technologies would include Advanced Light Water Reactors (ALWR), Advanced Liquid Metal Reactors (ALMR), and the High Temperature Gas-Cooled Reactor (HTGR).

Title XIII would augment the Nuclear Regulatory Commission's (NRC's) licensing rule, 10 CFR Part 52, to limit the scope of a post-construction licensing hearing and permit plant operation during a hearing under some circumstances.

NATIONAL ENERGY STRATEGY

Turning now to the National Energy Strategy, I will highlight some aspects of the process used at arriving at the strategy and describe some of its features that are being, and would be, implemented.

One of the foundations for the National Energy Strategy was a process of public consultation without precedent in U.S. energy planning. The public record established is the result of 18 public hearings, presentations by nearly 450 witnesses, and over 1,000 written submissions. More than 500 commentators addressed nuclear energy during this process. In addition to the public input, we received over 20 state government energy plans.

This massive information collection effort was supplemented by thousands of hours of analytical work within DOE which was then painstakingly reviewed on an interagency basis. The results were the detailed National Energy Strategy, which has been presented to the Congress, and a set of more detailed backup analysis documents which can be provided in order to add to the information now publicly available.

I think it should, therefore, be evident that DOE has already carried out an extensive public consultation process and has utilized the input received in developing a plan for presentation to the Congress. The National Energy Strategy chapter on nuclear power lays out a specific program for the future development and use of advanced-design nuclear generating plants. We believe that these actions and results satisfy, and eliminate the need for, the requirements of Section 12004 of S. 341.

BASIC FEATURES AND PRINCIPLES OF THE NATIONAL ENERGY STRATEGY

For nuclear power, as with other supply and conservation technologies, the National Energy Strategy will be implemented largely through actions that do not require legislation, other than appropriations. DOE's intended National Energy Strat-

egy legislation will propose needed legislative actions in two specific areas for nuclear power—nuclear licensing reform and nuclear waste management.

Several principles underlie the basic approaches described in the National Energy Strategy. They are:

To concentrate on removing undue institutional and regulatory obstacles to the expanded use of nuclear power and to establish an efficient process through which the private sector can build and operate new nuclear power plants on a safe and economic basis.

To collaborate with the private sector by cost sharing to reduce the front-end risk of the expense of preparations for constructing new nuclear power plants.

To permit the free market to choose those technologies and designs desired to be built.

These principles would be implemented through the specific actions called for in the National Energy Strategy which I will now describe.

NUCLEAR POWER OBJECTIVES AND PROGRAMS

The National Energy Strategy examined the need for expansion of nuclear power based on electricity growth, economics, energy security, and environmental considerations. We project that a substantial amount of new generating capacity—between 190 and 275 GWe must be added between 1991 and 2010 to serve the Nation's growing requirements for electricity. As a result, the basic objectives established for nuclear power in the National Energy Strategy are to achieve a first order for an advanced-design nuclear generating plant by 1995 and to start operation of the first such plant by 2000. These objectives are shared by the private sector, as reflected in the Strategic Plan issued by the Nuclear Power Oversight Committee of the electric utility industry.

The National Energy Strategy defines a series of actions that will enable a nuclear plant to be ordered by 1995. In several instances we have issued, or will issue, Requests for Proposals to select—on a competitive basis—private sector partners with whom we would share the costs of demonstrating some of the new features of the 10 CFR Part 52 licensing process and the risks of bringing new nuclear power plant designs to a point where they would be viable in the commercial marketplace. Thus, through a series of actions or programs, we are already carrying out or planning the types of activities contemplated in Section 12005 of S. 341.

The first such program is certification by the NRC of two evolutionary 1300 MWe ALWR designs and two passive 600 MWe ALWR designs. The schedules for certification of those designs are currently being determined with the NRC, based upon the recent Commission decision on the level of detail required for certification with which, after much interaction with the NRC, we are satisfied. The earliest date for certification of an evolutionary plant would now appear to be 1993. Certifications of passive designs are targeted by the National Energy Strategy to be completed by 1995. Further, these certifications must be achieved so that future changes would not be needed except in exceptional circumstances and thus indemnification against subsequent NRC regulation would not be required. We do not foresee the possibility of a new nuclear power plant order until the 1993-1995 time frame. Therefore, any attempt to seek an applicant for a combined operating license under 10 CFR Part 52 would be premature at this time.

The second program-standardization of nuclear plant designs—is necessary if schedules and costs required for economic use of nuclear power are to be met. We have included in the National Energy Strategy a DOE cost-shared program to complete first-of-a-kind engineering so as to achieve commercial standardization of at least one new nuclear power plant design by 1995. We announced the commencement of this program in conjunction with the release of our FY 1992 budget proposal. We have had considerable discussion with the private sector regarding this future program and are pleased to see an emerging interest in private sector funding of the required design work. Completion of this program is important to advance new nuclear power plant designs to the point where firm prices can be offered and sufficient certainty about costs and schedules can be developed to permit private sector financing and construction of such plants. The manner in which this program will proceed and be funded in the future will depend upon the response we receive from the private sector, particularly the electric utility industry.

We have also initiated a third activity, an early site permit program, to demonstrate use of the siting provisions of 10 CFR Part 52. We expect to receive a response to our Request for Proposals on this activity this year and to complete the program by 1995.

I have two overall observations regarding these programs. First, they represent our approach to the removal of undue obstacles to, and reduction of the front-end risks of, expanded nuclear power use. Our plan does not contemplate a formal DOE role in an application for a combined operating license or indemnification of added construction costs due to NRC regulation, even for a first new plant. Unless the processes through which new nuclear power plants are built are sufficiently reformed so as not to require government participation, the undue obstacles to nuclear power have not been adequately removed. We would expect to lend support and advice to prospective owners in matters such as financing, licensing and state economic regulation, but not through direct Federal Government participation, which would be an inappropriate role.

Second, our approach provides maximum flexibility for ultimate decisions to be made by the free market. In our work on these initiatives to date, we have found that such flexibility, as private sector interests emerge, is preferable to having the government attempt to form through a procurement process a set of institutional arrangements to bring about the construction of a new nuclear power plant.

A fourth focus of the National Energy Strategy plan for nuclear power is the achievement by 1995 of suitable progress on high level nuclear waste solutions to enable a new nuclear power plant order. Such progress is required on characterization of the Yucca Mountain candidate waste repository site. Further, by 1995 we should have selected a Monitored Retrievable Storage (MRS) facility site and submitted a license application to the NRC, pointing towards first operation of an MRS facility in 1998. Evaluation of the feasibility of actinide recycle and the ALMR/IFR fuel cycle as a potential contributor to future nuclear waste management should also be completed by 1995.

COMMERCIAL DEMONSTRATION PROJECTS

Let me make several points specifically regarding the commercial demonstration of advanced reactor designs. First, design certification and application of ALWRs does not require plant technological demonstration, such as envisioned in Section 12006, since ALWR's are based on extensions of existing, and proved, technology and new features that will have been demonstrated by system or component tests.

Second, certification of ALMR and HTGR designs based upon completion of technological demonstration projects is estimated to occur by about 2005. By 1995, the nature of such technological demonstrations may be identified and established. Should an HTGR New Production Reactor be built, it is quite possible that a module of such a plant could be the basis for the technological demonstration needed to certify a commercial HTGR design. A demonstration project for the ALMR is unlikely to be defined before 1995 and may well involve considerable international cooperation.

These considerations are reflected in the National Energy Strategy which has been provided to the Congress. Hence, we believe that it is premature to contemplate in S. 341 a Request for Proposal for an advanced reactor demonstration project in the near future. Further, the ALWR should not be one of the candidates for such a demonstration.

NUCLEAR LICENSING REFORM

The NRC made important progress in nuclear licensing reform in 1989 by issuing 10 CFR Part 52. However, it did not completely eliminate the possibility of an adjudicatory hearing and possible procedural delays after a plant is completed. Further, in November 1990, the U.S. Court of Appeals for the District of Columbia vacated the provisions of 10 CFR Part 52 that relate to the post-construction hearing, observing that such reforms lie not with NRC, but with Congress. This court decision, though on appeal, emphasizes the need for a clear statutory basis for a fully reformed licensing process for new nuclear powerplants.

Title XIII of S. 341 represents a major improvement in defining a fair, predictable licensing process. I will not comment on specific provisions of Title XIII because the Department will soon be submitting licensing reform provisions as part of its National Energy Strategy legislation. Our legislation will build upon 10 CFR Part 52. It will contain provisions of the rule, require resolution of emergency planning issues before construction, and eliminate the potential procedural delays of a post-construction hearing, while allowing valid safety issues raised by the public to be addressed. Our bill will strengthen the provisions of S. 341 relating to a post-construction hearing by: requiring a showing before a hearing is granted that a nonconformance with the plant license would lead to lack of adequate protection of public health and safety; specifying a less procedural, informal hearing; assuring plant op-

eration pending a hearing decision in cases where adequate protection is not affected; and providing flexibility in handling licensing changes that do not affect safety.

We believe that the proposed licensing process of 10 CFR Part 52, as it would be modified by our legislation, will continue effective opportunities for public involvement in nuclear plant licensing. It will allow members of the public to make their views known on plant design and safety features, siting, and plant construction earlier than under the old two-step licensing process. The public will continue to have the opportunity to raise valid safety issues at the completion of plant construction and during plant operation. The provisions of DOE's proposed National Energy Strategy legislation will, at the same time, serve the overall public interest by requiring timely resolution of such issues and by limiting the opportunity for use of dilatory legal tactics by a small minority who would deny the benefits of nuclear power to the 80 percent of the American people who believe that it will be very or somewhat important in meeting the Nation's future electricity needs.

Based on studies DOE performed in connection with the development of the National Energy Strategy, we will propose in its associated legislation provisions that we believe will be sufficient to restore investor confidence and permit new orders for nuclear power plants. Accordingly, we will recommend that the licensing reform provisions of that legislation be included in S. 341.

NUCLEAR WASTE MANAGEMENT

I indicated previously that an action essential to the revitalization of nuclear power is the demonstration of progress in the management and disposal of high level nuclear waste. To accomplish this, I would note that DOE will propose, in its National Energy Strategy legislation, two sets of provisions that are critical to the successful implementation of the Nuclear Waste Policy Act of 1982 under today's circumstances. One set of provisions would enable DOE to carry out site characterization activities at Yucca Mountain in a timely manner. The second set of provisions would eliminate current linkages and constraints on the MRS facility, thereby allowing the MRS facility to start operation independent of progress on the high-level waste repository. Since a separate hearing will be held by this committee on the subject of nuclear waste management, I will not comment further on this subject or its relationship to S. 341.

CLOSING REMARKS

Before I take questions, I would like to reiterate that DOE agrees with the spirit of Titles XII and XIII of S. 341. Mr. Chairman, I, too, share your desire to see new nuclear powerplants again being deployed to meet the Nation's energy needs. I believe that the way to accomplish this is through the program laid out for nuclear power in the National Energy Strategy and expressed in our FY 1992 budget request and through the provisions of the soon-to-be-released National Energy Strategy legislative proposal. Our plan, which integrates government and industry actions in areas in which each performs best, transforms vision into action. Our approach is based on the philosophy that the government should lend a hand to the nuclear industry by removing institutional barriers which inhibit free market competition. We believe that such action will enable the expansion of nuclear power starting in 2000. DOE looks forward to a cooperative effort with this Committee to produce national energy legislation that will serve our mutual interests.

I thank you for this opportunity to comment on Titles XII and XIII and would be glad to answer your questions at this time.

The CHAIRMAN. Thank you very much.

Mr. Young, as you know, the Government was going to build two tritium production reactors. One was to have been the heavy water and the other was to have been the HTGR. And I think because of dollar constraints, they are going to simply build one now.

That technology, the decision on that will be announced, is it in December?

Mr. YOUNG. Yes, sir.

The CHAIRMAN. Are you on the team that picks that?

Mr. YOUNG. No, I am not.

The CHAIRMAN. Am I correct, that decision has not been made yet? I understand it is a lively competition.

Mr. YOUNG. It has not been made. It is a competition. My office has nothing to do with it, but I certainly can confirm that the decision will be made in December after extensive evaluation.

The CHAIRMAN. Now, when you said it was premature to pick an advanced reactor, we have got the ALWR and this is the one beyond ALWR.

It could be an HTGR, it might be liquid metal, or it might be anything. But it was not too early for the Government to pick a tritium reactor. When you said premature, you did not mean from the standpoint of scientific maturity, because the Government was going to—it might even do that very thing this year.

Mr. YOUNG. Well, in terms of a production reactor it may well. I was saying it is premature to contemplate a technological demonstration project to the legislation until we sort out some of the things that we already are looking towards.

The CHAIRMAN. What is the sorting-out process?

Mr. YOUNG. Well, for example, the competition will be known at the end of this year. I think the HTGR-NPR has a good chance of being selected. I think one of the advantages of selecting it is that of helping to enable the commercial development of the HTGR concept. I think that until that——

The CHAIRMAN. Does this not formalize a sorting-out process?

Mr. YOUNG. We do not see the sorting out to be—let me put it this way. The advanced light water reactor clearly is in a time frame that is different than the HTGR and the LMR by about 10 years.

The CHAIRMAN. Not if it produces tritium. If you pick the HTGR as a tritium production reactor, it will be ready. We will start it right away, will we not?

Mr. YOUNG. It will be ready by 1999, yes, sir.

The CHAIRMAN. I mean, we will start it right away.

Mr. YOUNG. Yes, sir.

The CHAIRMAN. It would be ready as soon as the ALWR was.

Mr. YOUNG. No. The ALWR will have a certified design between 1993 and 1995. To get a certified design for the HTGR, assuming you now use the NPR as a demonstration project, that project would have to have been completed and operational. The part of it that would be demonstrating the features——

The CHAIRMAN. I mean, the demonstration would be as soon as the ALWR demonstration.

Mr. YOUNG. No, sir. Let me focus on design certification of a commercial design.

The CHAIRMAN. Tell me, when would the HTGR, if it is picked to produce tritium, when would it be in operation?

Mr. YOUNG. The NPR plant would be in operation starting in 1999.

The CHAIRMAN. All right. Now, the ALWR would be in operation when?

Mr. YOUNG. The year 2000, the first one.

The CHAIRMAN. Well, that is what I mean.

Mr. YOUNG. Sir, I need to answer your question.

The CHAIRMAN. Well, you just did.

Mr. YOUNG. No, I did not.

The CHAIRMAN. That was my question.

Mr. YOUNG. No, sir, I did not.

The CHAIRMAN. I asked you when would they be in operation. You told me 1999 for the HTGR and 2000 for the ALWR.

Mr. YOUNG. For a utility organization to order a commercial design——

The CHAIRMAN. I did not ask you that. I did not ask you that, Mr. Young.

Mr. YOUNG. Sir, but I think if we are——

The CHAIRMAN. Go ahead. Go ahead and give the answer to the question I did not ask. Go ahead.

Mr. YOUNG. Pardon me. For a utility to order a commercial design, they must have a design certified by the NRC. That will occur for the advanced light water reactor between 1993 and 1995.

In order to get to a certified commercial design for an HTGR, you must go through a technological demonstration, which would hopefully be the NPR, and following that you must then go through the process of obtaining NRC certification of that commercial design, which we estimate would occur by the year 2005. So that there is a 10-year difference in time between the point at which a utility would be in a position to order a certified commercial design to be applied.

The CHAIRMAN. Well now, the sorting-out process, is this any formalized process, or do you have any ongoing plans to sort these things out, or just sort of let them happen?

Mr. YOUNG. I think for the HTGR and the ALMR, we see both technologies as potentially beneficial to the Nation. We hope to see the HTGR develop through the NPR. We believe the ALMR should also be brought along because of its potential eventual synergistic benefits used in conjunction with the light water reactor, that if you are able to demonstrate the feasibility of actinide recycle that some time early in the next century the use of the ALMR would permit you to benefit from that technology for light water reactor waste disposal, as well as LMR waste disposal.

So we see that the two technologies have quite different interactions with the light water reactor program.

The CHAIRMAN. I know, but I think the answer that you are giving is you do not have a formalized process, and that is what this legislation seeks to do.

Senator Craig.

Senator CRAIG. Let me add to what my chairman has said. There is a concern for a formalized process and an understanding of where we are headed here. I think that is critical, to bring on line—in fact, I was concerned. I understand budget constraints, but I was terribly concerned it there would be an indication on the part of the Department that we were moving away from duality.

I think it is critical. I think we need it and I think we can debate the defense side of it, but we can also understand the implications of the technology and the advancement of both approaches.

Let me thank you for your testimony and ask you questions as it relates to DOE's request for $49.5 million for advanced reactor program, the R and D of it. DOE indicates that the allocation of funds between the Modular High Temperature Gas Reactor and the Advanced Liquid Metal Reactor will be delayed until the results of an NAS study are available.

We first saw scheduling for that study in September of 1990. Now it is September of 1991. What are DOE's plans should the NAS study not be available before Congress completes action on the fiscal year 1992 appropriation bill?

Mr. YOUNG. Let me I guess address your last point first. There has been an ongoing study by the National Academy of Sciences. That study has been delayed because of factors inside the National Academy committee. I believe the current estimate for completion of that study is June 1991.

Within the administration, we and OMB wanted to take a look at some preliminary results of that study, which we had planned to do in February. We now have done that and we are prepared to go forward with an allocation of that amount of money. We will be submitting some paperwork this month to supplement the budget submittal to identify that allocation.

Senator CRAIG. So what you are telling me is you think you can move forward based on what you now know?

Mr. YOUNG. Yes, sir. Yes, sir, we have examined the information.

Senator CRAIG. $49.5 million is consistent with what NAS is finding?

Mr. YOUNG. Yes, sir. Yes, sir, absolutely.

I might comment on your earlier remark about a formal process. We believe we do have a formal process. The process is looking at the MHTGR and laying out a plan of action that would most effectively be able to demonstrate and bring that technology to the marketplace, and similarly laying out a plan of action for the ALMR, given that they do have different benefits.

Where we do not have a formal process is a decision to choose between those technologies at this time. We think it is premature to do so.

Senator CRAIG. The Department has indicated that a separate study on actinide recycle would be initiated to evaluate the feasibility of the recycling of actinide. I understand the study is to coincide with the NAS study.

How does the Department intend to pursue such a study? Where are you in that process? That would be one of my questions, and then how does the Department intend to ensure that the study will be completed in time to make the necessary decisions on the allocation of research funds within the advanced reactor research account?

Mr. YOUNG. We commenced the study in fiscal year 1991 through a reprogramming action. We are also allocating slightly in excess of $4 million during fiscal 1992 to continue those studies, so that we would be pursuing within the advanced reactors program both the technology development efforts and the actinide recycle studies, to bring them both along.

I think it will not be until actually about 1995 before we believe that enough work will be done, both in the demonstration of the technology for the liquid metal reactor and its fuel cycle and the actinide recycle evaluation to establish the feasibility of that process for potentially benefiting the nuclear waste solution.

Senator CRAIG. But they are paralleling each other at this time? You are satisfied with the progress then?

Mr. YOUNG. Yes, sir. We are proceeding as fast as we can on that, yes.

Senator CRAIG. Mr. Chairman, I have no further questions.

The CHAIRMAN. Thank you very much, Senator Craig.

Thank you very much, Mr. Young.

Next we will have a panel composed of Marcus A. Rowden with the Fried, Frank law firm here in Washington and Eric Glitzenstein with the Harmon, Curran law firm in Washington.

Mr. Rowden, why do you not begin.

STATEMENT OF MARCUS A. ROWDEN, FRIED, FRANK, HARRIS, SHRIVER & JACOBSON

Mr. ROWDEN. Thank you, Mr. Chairman. With your permission, I propose to summarize the prepared testimony that I have submitted for the record.

The CHAIRMAN. Yes, please do.

Mr. ROWDEN. My testimony today focuses on title XIII of S. 341, the bill's licensing provisions. Title XIII as I read it would do two things: It would confirm the NRC's authority to limit the issues in any preoperational hearing on a combined license to matters of nonconformance with the combined license; and it would give the NRC important new authority to permit facility operation under a combined license, notwithstanding a preoperational hearing request, if the Commission determines that the alleged nonconformance could not materially and adversely affect safe operation.

Title XIII also leaves intact the current NRC authority to take action to modify a combined license when necessitated by events subsequent to combined license issuance.

I strongly endorse these legislative aims.

The NRC's new part 52 regulations are my starting point. These new regulations in my view vastly improve nuclear power plant licensing by requiring an information base and applying procedures that allow final NRC decisions on design and site issues to be made with full public input before nuclear power plant construction begins.

Part 52 responds to the reality that standardization and licensing reform are closely coupled. The ability of the nuclear industry to provide essentially complete standardized designs makes licensing reform possible. The other side of the coin is that early decisions on design issues and assuring their finality are essential for realizing standardization.

It is central to the new NRC regulations that design and site issues be resolved before plant construction begins. Insistence and early and definitive issue resolution is rooted in the harsh experience with traditional two-stage licensing processes and the enormous financial and power supply risks that that experience showed.

No utility can be expected to forget the Seabrook operating licensing proceeding took 9 years and, to cite another stark example, the Shoreham operating license proceeding took 13 years to complete, and was followed by the licensee's termination of the project at a total cost ultimately to the public of over $5 billion. Each of

these proceedings involved issues that a workable licensing process should resolve before plant construction begins.

Now, following the adoption by the NRC of its part 52 regulations, two of the major elements of those regulations were challenged in a review proceeding in the U.S. Court of Appeals for the District of Columbia Circuit. In a decision last November, the Court of Appeals upheld the Commission's authority to issue a combined license, which was one of the disputed provisions, but went on to determine that the part 52 provisions limiting preoperational hearings to conformance issues violated section 189(a) of the Atomic Energy Act.

The court held that section 189(a) requires a hearing opportunity as a matter of right on significant new information that might arise after combined license issuance.

Both the NRC and the Nuclear Management and Resources Council, an intervenor in the court proceeding supporting part 52, have sought reconsideration and rehearing en banc with regard to the latter holding. Those requests have been pending judicial determination since mid-December of last year.

I would note at this point that I am counsel for NUMARC in the judicial review proceeding.

There are compelling reasons for preserving the part 52 limitations on preoperational hearings. Permitting hearings as a matter of right on previously resolved issues after a plant has been constructed strikes at the heart of design standardization and the final issue resolution at the pre-construction stage.

I would emphasize that the part 52 regime provides not only for Commission findings after full hearing rights on all material licensing issues; it also includes an array of procedures for the consideration of significant new information after a combined license has been issued. The most notable of these is an expedited process for modifying the terms of the combined license in response to petitions alleging new information or new developments.

Part 52 obligates the Commission itself to consider such petitions and to determine whether any immediate action is required before commencement of facility operation.

Title XIII would confirm the Commission's authority to limit preoperational hearing issues to matters of alleged nonconformance with the combined license. While I believe the NRC now possesses full authority to so limit preoperational hearing issues, confirmatory legislation, coupled with the additional authority that would be conferred by title XII, which I will summarize below, would in my view significantly aid the licensing process.

Now, there are also compelling reasons supporting the second objective of title XII, allowing operation of a facility constructed under a combined license if the Commission determines that the issues awaiting hearing consideration could not materially and adversely affect the safety of facility operation. This is authority the NRC believes that it does not currently possess and which I believe it should be given.

While in all candor I question the wisdom of requiring a licensing hearing after a facility has been constructed and I believe construction conformance can best be dealt with by the NRC inspection and compliance process, any such hearing, at the very least,

should not be permitted to delay facility operation absent a sound safety reason.

Title XIII would confer express authority on the NRC to permit such operation. In short, the preoperational hearing would be removed from the critical path to facility operation where public health and safety would not be adversely affected.

Now, Mr. Chairman, I would add these further observations as respects licensing improvements. First, I believe it would be desirable to provide for informal, rather than trial-type, procedures in conducting preoperational hearings. This would give the Commission flexibility to tailor hearing procedures to the specific issues requiring resolution. It would also expedite issue resolution, an important consideration whether a hearing precedes or follows commencement of facility operation.

The NRC employs such procedures in materials licensing and, while I believe current law also allows NRC that flexibility in reactor licensing, this is a matter where clarifying legislation would serve licensing predictability.

Further, I would suggest that the licensing provisions of titles XII and XII of S. 341, which presently differ in their formulation, be consolidated into a single procedure that is uniformly applicable to all reactor licensing proceedings. Differing provisions and terminology to deal with essentially similar licensing situations hold the unsettling potential for legal wrangling and hearing unpredictability at a project stage when this can least be tolerated.

My prepared testimony, Mr. Chairman, recommends some guiding principles for crafting this reformulation consistent with the position that I have just summarized.

Mr. Chairman, that concludes the summary of my prepared statement and I would be pleased to answer any questions that the committee has.

[The prepared statement of Mr. Rowden follows:]

PREPARED STATEMENT OF MARCUS A. ROWDEN, FRIED, FRANK, HARRIS, SHRIVER & JACOBSON

Mr. Chairman and Members of the Committee: My name is Marcus A. Rowden. I am a partner in the law firm of Fried, Frank, Harris, Shriver & Jacobson, resident in the firm's Washington office.

By way of professional background, after service in, and as the General Counsel of, the Atomic Energy Commission, I served from January 1975 through June 1977 as one of the first five commissioners of the newly established Nuclear Regulatory Commission; and between April 1976 and the expiration of my term on June 30, 1977, I was the Commission's Chairman. I have been actively involved in nuclear regulatory matters over the past 25 years and the views which I express today reflect a perspective shaped by my experience in both the governmental and private sectors.

As requested, my testimony today focuses on Title XIII of S. 341 (the "Nuclear Reactor Licensing Act of 1991") and, because of the common objectives, on the companion licensing provisions of Title XII. I come to the matter of nuclear licensing reform with some sharply defined views since, for the past several years, I have been actively involved on behalf of the nuclear power industry in helping to shape the content of the NRC's new Part 52 licensing regulations and in working toward their viable implementation. I, and many others, have advocated that the process by which nuclear power plants are licensed should be reformed. The reform aims are a process that is fair, effective and timely, and one that provides for meaningful public participation. Such a process clearly would be in the interest of ratepayers, utilities, their investors, and federal and state regulators. Such a process is also an essential component of any sensible national energy policy.

Title XIII of S. 341 would do two things:

It would confirm the NRC's authority to limit the issues in any preoperational hearing on a combined license to matters of non-conformance with the provisions of the combined license—a matter now being litigated in proceedings before the U.S. Court of Appeals for the District of Columbia Circuit contesting the NRC's imposition of such a limitation in Part 52.

And, it would give the NRC important new authority to permit facility operation under a combined license, if a preoperational hearing had been requested, where the Commission determines that the non-conformance matters at issue could not materially and adversely affect safe operation of the facility.

Title XIII also leaves intact the current NRC authority to take action to modify a combined license when such action is necessitated by events subsequent to combined license issuance.

I strongly endorse these legislative aims.

I. THE NRC'S PART 52 REGULATIONS

At the outset, it would be useful to give an overview of the NRC's new Part 52 regulations as they relate to standardization and licensing reform, and to summarize developments supporting the legislative action which Title XIII proposes.

Two years ago, as the culmination of more than a decade of consideration, formulation and public debate, the Nuclear Regulatory Commission adopted Part 52 to its regulations. As relevant to S. 341, Part 52 provides for the regulatory approval of standardized nuclear power plant designs based on the resolution in public rulemaking proceedings of all material safety issues. Equally important, Part 52 also provides for the issuance of combined construction and operating licenses, after full public hearings, for facilities referencing those designs, and for preoperational reviews limited to issues not previously resolved—namely, construction conformance with the combined license. A central feature of Part 52 supporting this preoperational limitation are the inspection tests, analyses and acceptance criteria (ITAAC) prescribed as a basis for combined license issuance and as the basis for later assurance of preoperational conformance. The ITAAC are made possible by, and derive from, more than 30 years of nuclear power plant construction and operating experience.

These new regulations vastly improve nuclear power plant licensing by requiring an information base and prescribing procedures that allow final NRC decisions on design and site issues to be made, with full public input, before nuclear power construction begins.

Part 52 contrasts sharply with the so-called "design-as-you-go" process that characterized reactor licensing over the past three decades. Under that process, the Commission, on the basis of only limited design information, would decide whether to issue a construction permit; and, some years thereafter, it would conduct a full review of the final design of the constructed plant and decide whether to grant an operating license. Such a process, with its lack of pre-construction finality and enormous costs associated with resolving design issues after construction was complete, stood as an obstacle to the development and use of preapproved standardized designs. Another grave deficiency was that public hearings on a nuclear plant took place either too early or too late—prior to construction when only limited design information was available, or after a plant had been fully constructed and billions of dollars had been expended.

Part 52 responds to the reality that standardization and licensing reform are closely coupled. The ability of the nuclear industry to provide essentially complete standardized designs makes licensing reform possible. By like token, providing early decisions on design and site issues and assuring their finality is essential for accomplishing the goals of standardization.

Thus, it is key to the new NRC regulations to resolve issues before plant construction begins and to limit preoperational hearing issues to matters of conformance with the acceptance criteria contained in the combined license which are the basis for determining whether the plant has been constructed and will operate in accordance with the requirements of the combined license, the Commission's regulations and the Atomic Energy Act. The premise behind this preoperational regime—the most thoroughly debated provisions in the Part 52 rulemaking—was that matters resolved in connection with issuance of the combined license (or the design certification which it references) should not be subject to relitigation. Because design and site issues will have been resolved prior to construction, the only issues which should be open to dispute resolution at the preoperational stage are conformance issues, which could not be resolved prior to commencement of plant construction.

This preoperational hearing limitation was recognized by the Commission to be essential if the benefits of standardization were to be realized and, in fact, nuclear power were to be a viable energy option for the Nation's future. Insistence on early and definitive issue resolution was rooted in harsh experience with the traditional two-stage licensing process and the enormous financial and power supply risks that it entailed. Indeed, the Part 52 rulemaking comments submitted by the Nuclear Management and Resources Council (NUMRC) on behalf of the nuclear power industry bluntly stated that "no one could seriously consider ordering a new plant with the licensing uncertainties it would face" with anything similar to the old two-stage licensing process. As stark background, it may be noted that the operating license proceeding for the Seabrook Nuclear Power Plant took nine years, exclusive of judicial review. The operating license proceeding for the Shoreham Nuclear Power Plant commenced in 1976 and ended in 1989, thirteen years later, followed by the licensee's termination of the project at a total cost, ultimately to the public, of over five billion dollars. Each of these licensing proceedings entailed enormous costs and each involved issues that a workable licensing process should resolve before plant construction begins, not after a facility has been built and awaits operation.

II. THE NIRS DECISION AND ITS IMPACT

Following the adoption of Part 52, two of its major elements were challenged in a judicial review proceeding in the U.S. Court of Appeals for the District of Columbia Circuit. (*Nuclear Information and Resource Service, et al.* v. *NRC*). The petitioners in that proceeding disputed the Commission's authority to issue combined licenses and the limitations placed by Part 52 on issues which may be the subject of preoperational hearings. In a decision rendered on November 2, 1990, the court of appeals upheld the Commission's authority to issue a combined license but went on to determine that the provisions of the new regulations limiting preoperational hearings to issues of conformance with combined license requirements violated Section 189(a) of the Atomic Energy Act. The court of appeals ruled that § 189(a) mandates there be an opportunity for a hearing as a matter of right on "significant new information" that might arise after combined license issuance. Both the NRC and NUMARC, an intervener in the court proceeding supporting Part 52, have sought reconsideration and rehearing en banc by the court of appeals with regard to the latter holding. Those requests have been pending judicial determination since mid-December of last year. (I would note that I am counsel for NUMRC in the judicial review proceeding.)

There are compelling reasons for preserving the Part 52 limitations on preoperational hearings. The inescapable impact of the court's holding is to thwart preconstruction resolution of all material safety issues—thereby restoring, in practical effect, the outmoded two-stage licensing process and its attendant uncertainties. As a practical matter, the court's ruling would permit any party to reopen already resolved issues after a plant has been constructed by alleging new information purportedly relating to safety. This strikes at the heart of final issue resolution at the preconstruction stage—a prerequisite for industry and investment community commitment of the enormous resources needed to develop standardized designs and for later willingness of utilities to order nuclear power plants.

I would emphasize, in this regard, that the Part 52 regulatory regime provides not only for Commission findings and full hearing rights—on all material licensing issues, it also includes an array of procedures for the consideration of significant new information after a combined license has been issued. First, Part 52 provides an expedited process for modifying the terms of a combined license, in response to petitions that could be filed under 10 C.F.R. § 2.206, which could be based on new information or developments. Part 52 obligates the Commission itself, not the NRC staff, to consider such petitions and to determine whether any immediate action is required before commencement of facility operation (10 C.F.R. § 52.103(b)(2)(ii). New information relating to design safety also could be raised in a rulemaking petition (10 C.F.R. § 52.63(a)(1). Thirdly, an interested party could seek a waiver from the Commission, on the basis of new information, to avoid the preclusive effect of issues resolved in a design certification rule (10 C.F.R. § 52.63(a)(4).

The amendments to § 189(a) of the Atomic Energy Act contained in Title XIII of S. 341 would expressly confirm the Commission's authority to limit preoperational hearing issues to matters of alleged non-conformance with the combined license. While I firmly believe the NRC now possesses full authority to so limit preoperational hearing issues, confirmatory legislation—coupled with the additional authority that would be conferred by S. 341, as discussed below—would significantly aid the process.

III. AUTHORITY TO PERMIT FACILITY OPERATION

There are also compelling reasons supporting the second objective of Title XIII—allowing operation of a facility constructed under a combined license if the Commission determines that the issues awaiting hearing consideration could not materially and adversely affect the safety of facility operation. This is authority that the NRC believes it does not currently possess and which, I believe, it should be given.

While, in all candor, I question the wisdom of requiring a licensing hearing after a facility has been constructed (I believe construction conformance can best be dealt with by the NRC inspection and compliance process) any such hearing, at the very least, should not be permitted to delay facility operation absent a sound safety reason. Title XIII would confer authority on the NRC to permit commencement of facility operation notwithstanding the pendency of a hearing request if no showing has been made that the alleged non-conformance "could materially and adversely effect the safe operation of the facility". In my view, the current NRC inability to exercise such a judgment exalts procedure over substance, with the utility and its customers bearing the economic and energy impacts of unwarranted delay.

In assessing the justification for the Commission's having such authority, it should be remembered that all design, site and operational safety issues will have been resolved before issuance of a combined license; that construction conformance will be governed by the inspections, tests, analyses and acceptance criteria (ITAAC) specified in the combined license; and that, pursuant to Part 52 requirements, ITAAC conformance will be monitored, approved and publicly noticed by the NRC as facility construction progresses. In such circumstances, Commission authority to permit facility operation pending resolution of issues which it determines are not a threat to public health and safety is clearly in the public interest.

In short, the preoperational hearing should be removed from the critical path of facility operation where public health and safety would not be adversely affected.

IV. ADDITIONAL LICENSING IMPROVEMENTS

I would add these further observations as respects licensing improvements:

First, I believe it would be desirable to provide for informal rather than trial-type procedures in conducting preoperational hearings. This would give the Commission flexibility to tailor hearing procedures to the specific issues requiring resolution. It would also expedite issue resolution—an important consideration whether such a hearing precedes or follows commencement of facility operation. The NRC employs such procedures in materials licensing (10 CFR Part 2, Subpart L). While I believe current law also allows NRC that flexibility in reactor licensing, this is a matter where clarifying legislation would serve licensing predictability. (I note, in this regard, a recent court of appeals decision which characterized the type of hearing procedures required by law for reactor licensing proceedings as an "open question". *UCS* v. *NRC*, United States Court of Appeals for the District of Columbia Circuit, Nov. 30, 1990, slip op. p. 6).

Further, I would suggest that the licensing provisions of Titles XII and XIII, which presently differ in their formulation, be consolidated into a single procedure that is uniformly applicable to all reactor licensing proceedings. Differing processes and terminology to deal with essentially similar licensing situations hold the unsettling potential for legal wrangling and hearing unpredictability at a project stage when such a regulatory environment can least be tolerated.

In this reformulation, I would suggest that Section 185 as well as Section 189 of the Atomic Energy Act be appropriately amended since the two sections are interrelated as respects preoperational findings and hearings. Without crafting this reformulation here, I would recommend some guiding principles:

NRC preoperational determinations should be based on conformance with acceptance criteria, including those applicable to emergency planning.

Correspondingly, the preoperational hearing opportunity should be limited to substantiated issues of acceptance criteria non-conformance.

Any such hearing should be held using informal procedures unless the Commission determines that more formal procedures are required to resolve certain issues because of their special character.

And, authority should be specified to allow facility operation pending a preoperational hearing unless the Commission determines such operation cannot be conducted consistent with adequate protection of the public health and safety.

In conclusion, Mr. Chairman, Title XIII of S. 341 is a welcome initiative that could significantly enhance the working value of the standardization and licensing reform measures inaugurated by the Commission in its Part 52 regulations. As such, it is clearly in the public interest.

The CHAIRMAN. Thank you very much, Mr. Rowden.
Mr. Glitzenstein.

STATEMENT OF ERIC R. GLITZENSTEIN, ON BEHALF OF THE UNION OF CONCERNED SCIENTISTS AND NUCLEAR INFORMATION AND RESOURCE SERVICE

Mr. GLITZENSTEIN. Good afternoon, Mr. Chairman. I appreciate the opportunity to testify before the committee.

There is one central message to our prepared testimony, which of course is being submitted for the record, and I will try to shorten those remarks considerably. But the central message in our testimony is that, irrespective of one's views on nuclear power and whether nuclear power should play a significant role in the Nation's energy future, the proper way to go about dealing with nuclear power is not to adopt provisions, amendments, that would substantially cut back on public participation in the licensing process.

In fact, we believe that that is precisely the opposite of what should be done in order to bring back public confidence in nuclear power if public confidence is ever to return.

As I sat here this morning, I found it quite fascinating that the major theme that was reiterated by virtually everyone in the hearing, including the proponents of nuclear power from the nuclear industry, is that there needs to be public participation. There needs to be some sense of public support for this technology.

But the syllogism I cannot quite follow. It seems to be something along the following lines: There is currently skepticism about nuclear power and there is some participation in the process. The second step is: We will adopt legislation significantly reducing public participation in the licensing process. Hence, three, the conclusion is there will be more public faith in nuclear power, particularly when we are dealing with new technologies that have, everyone would concede, not been tested as to this date.

We do not follow that syllogy. We think it is, as virtually everyone who would look at it would conclude, it is the opposite of what you really need to do in order to ensure that there is some public faith in the process.

I think Mr. Rowden gave a good overall summary of how we got to this point in terms of the legislation being considered today. But I do not think he completely accurately characterized the Court of Appeals decision which this legislation would overturn. I think where that Court of Appeals decision ended up was an extremely narrow, fine-tuned kind of decision, and it is important to focus on what it said.

It said that the NRC at the post-construction phase, prior to operation, would have plenty of authority and power to decline public requests for hearings on issues that either were considered at some point in the past, at a prior hearing or prior proceeding, or could have been the subject of a prior hearing or prior proceeding.

It also reiterated, and another Court of Appeals decision that came out at around the same time reinforced this point, that the NRC can knock out contentions that are raised by members of the public or States or localities which are deemed to be frivolous,

which are deemed to be insubstantial, which are deemed to not require any kind of a hearing.

What the Court of Appeals said that the Commission could not do—and we would submit that this was the right answer as a policy matter as well as a legal matter—was prevent the public from having a hearing on significant safety-related developments which were not subject to a prior proceeding and could not have been subject to a prior proceeding.

[The prepared statement of Mr. Glitzenstein follows:]

PREPARED STATEMENT OF ERIC R. GLITZENSTEIN, ON BEHALF OF THE UNION OF CONCERNED SCIENTISTS AND NUCLEAR INFORMATION AND RESOURCE SERVICE

INTRODUCTION AND SUMMARY

Senators Johnston and Wallop have proposed, in S. 341, an amendment that would do away with the existing two-step licensing system for nuclear power plants, and would effectively undermine the public's ability to prevent unsafe plants from operating. The bill would resurrect an NRC rule—recently declared illegal by the United States Court of Appeals for the D.C. Circuit which precluded the public from having any say on crucial questions concerning the ability of nuclear plants to operate safely, such as design defects, earthquake risks, and evacuation problems in the event of an accident.

The Court of Appeals' decision—which the Johnston-Wallop bill would overrule—concluded that, before a nuclear power plant begins to operate, members of the public must have an opportunity to be heard on important health and safety issues that were not previously considered or resolved by the Commission in any earlier proceeding.[1] There is no justification whatsoever—nor has any been suggested by Senators Johnston or Wallop—for Congress to overrule this narrow, sensible decision, which was joined by both a Bush appointee (Judge Clarence Thomas) and a Reagan appointee (Judge David Sentelle).

The Johnston-Wallop proposal is unnecessary, unwise, and unfair:

It is unnecessary because neither the NRC nor nuclear industry are able to point to a single example of a power plant whose operation has been delayed inappropriately by public hearings, and because the NRC has adopted numerous other ways of streamlining the licensing system which were not invalidated by the Court of Appeals;

It is unwise since it would substantially increase the risks that unsafe and environmentally destructive nuclear plants will go into operation, both because members of the public and state and local governments would be precluded from raising serious safety-related concerns, and because the NRC itself would be hamstrung in carrying out its fundamental mission to protect the public health and safety;

It is fundamentally unfair because, not only would it abandon the bedrock principle of our democracy that people whose health and safety may be adversely affected by governmental action should at least be permitted to be heard on the matter, but it would even go so far as to discard one of our system's greatest guardians against arbitrary and abusive administrative behavior: the right of persons who are aggrieved by governmental decisions to seek judicial review and redress.

Since the Johnston-Wallop bill would accomplish these untoward results by reviving the NRC's rule and overturning the Court of Appeals' decision, it cannot be fully understood without an appreciation of both the NRC's rule and the Court's reasoning in striking it down. After briefly describing this regulatory and statutory context, we will explain in detail why it would be a terrible mistake for Congress to enact the Johnston-Wallop proposal.

1. The NRC's Twenty-year Effort to Cut the Public Out of the Licensing Process

When Congress enacted the Atomic Energy Act of 1954 ("AEA"), it established a two-step process for the construction and operation of commercial nuclear plants. Under sections 185 and 189 of the AEA, a utility must first obtain a construction permit and then, following construction, it must apply for an operating license.

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[1] *Nuclear Information and Resource Service and Union of Concerned Scientists* v. *Nuclear Regulatory Commission*, 918 F.2d 189 (D.C. Cir. 1990).

Members of the affected public have a right to a hearing at both stages of the process.

Congress purposefully rejected a system under which the NRC's post-construction review, and the public's right to a hearing, would be limited to whether the plant had been built in accordance with the terms of the construction permit. Instead, because of the extraordinary health and safety risks posed by nuclear power, Congress determined that the NRC's pre-operation review, and the public's right to a hearing, must encompass all safety-related issues arising since the construction permit was issued, such as new developments bearing on the design, siting, and environmental consequences of the plant.

The two-step licensing system has existed for over 35 years, although the NRC and nuclear industry have waged a virtually non-stop battle to abolish it. In fact, the Johnston-Wallop bill is functionally identical to licensing "reforms" that have been pushed by the executive branch and the nuclear industry for nearly two decades—and which have been steadfastly rejected by Congress on the grounds that they would go too far in restricting the rights of citizens to participate in decisions that are fundamental to their health and well-being.

As early as 1974, the Atomic Energy Commission ("AEC")—the forerunner of the NRC—and the nuclear industry began pushing for legislation that would do away with the two-step licensing system. Similar changes were sought by the NRC in 1977, 1978 and 1979, but, as explained by former NRC Commissioner Peter Bradford, this was an "ill-fated effort that terminated abruptly on the morning that . . . [NRC] Chairman [Joseph M.] Hendrie was advising Governor Thornburgh of Pennsylvania that pregnant women and young children should no longer be within five miles of Three Mile Island." [2]

Despite the disaster at TMI, the NRC and nuclear industry continued to plead for a short-circuiting of the licensing process during the 1980s. But Congress continued to reject these "reforms"—including the most recent legislative initiative, which was introduced by Representative Dannemeyer last year—on the grounds that they are unnecessary, unwise, and unfair. For example, the House Committee on Interior and Insular Affairs explained in 1982 that the

> hearing process serves a vital function as a forum for raising relevant issues regarding the design, construction and operation of a reactor, and for providing a means by which the applicant and the Commission staff can be held accountable for their actions regarding a particular facility. *The Committee feels that the hearing process is essential to obtain public confidence in the licensing process. which is needed if the nuclear option is to be preserved.*[3]

On the other side of the equation, the NRC and its industry cohorts have been incapable of demonstrating to Congress that public participation has caused delay in the operation of nuclear reactors. As former NRC Commissioner Peter Bradford testified before the Senate Subcommittee on Nuclear Regulation in 1983:

> [C]ontrary to a popularly held myth, the public hearings aspects of the licensing process has *never delayed a single nuclear power-plant's operation by a single week.* Indeed, one reads the many pages of industry, NRC and DOE testimony in vain for a single specific illustration of a licensing delay . . . that this legislation would cure.[4]

Likewise, former NRC Chairman Nunzio Palladino (a staunch supporter of licensing "reform") flatly admitted to Senator George Mitchell that the Commission has no information "reflecting [any] specific instances where the hearing process has delayed a nuclear power plant's operation. . . ." [5] In view of these concessions, it is not surprising that the Commission's repeated efforts to cut the public out of the nuclear licensing process have never even succeeded in making it out of Committee.

2. The NRC's Decision to Take Matters Into Its Own Hands

Dissatisfied with Congress' refusal to undermine public involvement in the licensing process, the NRC decided to adopt by fiat the same licensing "reforms" that

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[2] NRC Licensing Reform: Hearing Before the House Subcommittee on Energy Conservation and Power of the Committee on Energy and Commerce, 98th Cong., 1st Sess. 169 (1983) ("1983 House Hearing").

[3] H.R. Rep. No. 22, Pt. II, 97th Cong., 2d Sess. 10-11 (1982) (emphasis added).

[4] NRC Licensing Reform: Hearing Before the House Subcommittee on Energy Conservation and Power of the Committee on Energy and Commerce, 98th Cong., 1st Sess. 164 (1983) (emphasis added).

[5] 1983 House Hearing at 121.

Congress had rejected for twenty years. Consequently, in 1989, the Commission completely overhauled its licensing system, granting itself the authority to issue, prior to any construction, a "combined license for a nuclear plant"—i.e., a "combined construction permit and operating license." The NRC's rule further provided that the Commission's review following construction and prior to operation would be limited to whether the terms and conditions of the combined license were met, and that the Commission would not determine independently whether the plant, as actually built and in light of any intervening developments, would adequately protect the public health and safety.

The NRC also adopted severe limitations on the public's right to a hearing that essentially mirrored the restrictions that the Commission imposed on its own post-construction review. Thus, under the rule, a member of the public could only obtain a post-construction hearing by filing a petition demonstrating that "one or more of the acceptance criteria in the combined license have not been met."

With respect to every other issue relating to whether operation of the nuclear plant would endanger the health and safety of the public—including such fundamental matters as the safety of the underlying design and the adequacy of emergency planning—the NRC's rule provided that the public had no right whatsoever to a post-construction hearing. Instead, such issues could only be raised in documents known as section 2.206 petitions, which do not afford the public any right to a hearing. Moreover, several courts of appeals, including the D.C. Circuit, have held that denials of section 2.206 petitions by the Commission are not even subject to judicial review.

The NRC's overhaul of its licensing system—which took up 30 pages in the Federal Register and consisted of 103 separate sections—enacted numerous other revolutionary changes in the Commission's licensing system, which the Commission had also unsuccessfully urged Congress to enact during the prior two decades, and which further undermined the public's ability to participate in the licensing process. In effect, these changes make possible the "banking" of reactor designs and sites years before a utility even applies for a combined license or, indeed, before it even has any concrete intention of constructing a nuclear plant.

Hence, the NRC declared that "any person may seek a standard design certification for an essentially complete nuclear power plant design." Under the rule, the Commission can certify designs for up to fifteen years and renew them for another ten to fifteen years. Once a design has been "certified" by the Commission in a generic rulemaking proceeding, any utility including one with no prior involvement in the design certification proceeding—may "reference" the design in its application for a combined license. At the combined license stage, however, members of the public are precluded from raising any safety questions regarding the basic design—because it was "certified" in a generic rulemaking proceeding taking place up to thirty years earlier. On the other hand, the utility may request an exemption from one or more features of the design. In other words, in a licensing proceeding, the utility may seek to water down the certified design but intervenors may not seek to strengthen it or challenge it.

Yet another fundamental change adopted by the Commission is the power to grant "early site permits," which are supposed to determine the general appropriateness of the site for a nuclear power plant, including the potential for evacuation in the event of an accident. Under the rule, any utility may apply for an early site permit which would be valid for up to twenty years and could be renewed for another twenty years.

As with design certifications, any utility applying for a combined license may "reference" a previously-granted early site permit. If the utility does so, then the Commission will not consider in the licensing proceeding, and will refuse to hold any hearings on, the overall suitability of the site for a nuclear facility, including such fundamental issues as the environmental sensitivity of the location or its susceptibility to evacuation by the public in the event of an accident. But, once again, the Commission's rule only works one way—while the public is precluded from raising general siting issues at the licensing stage, the utility which seeks to rely on an early site permit is free to seek a "variance from or more elements of the permit."

3. The Challenge by Public-Interest Groups to the NRC's Rule

Despite the numerous ways in which the NRC sought to undermine public participation in the licensing process, public-interest groups did not challenge, and the Court of Appeals did not invalidate, the overwhelming majority of the fundamental "reforms" adopted by the Commission. Specifically, public groups did not challenge the Commission's authority to "certify" generic designs or to grant early site permits—changes which the NRC and nuclear industry had claimed were essential to

promote the standardization of nuclear plants and to streamline the licensing process.

Instead, the Union of Concerned Scientists ("UCS") and the Nuclear Information and Resource Service ("NIRS") narrowly focused their challenge on those aspects of the rule which would preclude members of the public living near a proposed nuclear plant from having any say on issues vital to their health, safety, and well-being. In making their case, UCS and NIRS relied heavily on the following hypothetical scenario to demonstrate the insidious way in which the Commission's rule would prevent member of the public from having any input on crucial safety issues:

> In December 1991, an engineering company requests a "standard design certification for an essentially complete nuclear plant design" which has never previously been tried and which no utility has expressed an intention or even an interest in using as the basis for a power plant at any particular site. The NRC "certifies" the design in a generic rulemaking proceeding;
>
> In 2001, a utility decides to construct a nuclear plant near Reno, Nevada. In its application for a combined license, the utility "references" the design that was "certified" by the Commission in December 1991; this is the first time that any utility has proposed to construct a power plant at a specific site with this design;
>
> Members of the public who are concerned about the construction of a nuclear plant in their community intervene in the licensing process and request a hearing on a number of issues, including the safety of the basic design of the proposed plant. They are told by the NRC, however, that it made a final decision on the design of the plant in a rulemaking proceeding over a decade ago. Obviously, none of the residents of the community participated in or had any reason to participate in the rulemaking proceeding which took place eleven years earlier and had no relationship to Nevada or any other specific location;
>
> In 2002, therefore, the NRC issues a combined license without ever allowing the residents of Reno to have a hearing on the safety of the basic design of the plant—a design, it should be emphasized, that is "evolutionary" and has never previously been tested in any commercial nuclear reactor;
>
> In 2006, five years into construction of the Reno plant, new scientific studies are published which raise serious, previously-unconsidered safety issues regarding the design of the plant. But when the residents of Reno request a hearing on these issues, prior to operation of the plant, they are told that they have no right to a hearing because they cannot demonstrate that the plant has not been built in accordance with the combined license;
>
> Consequently, the plant goes into operation in the absence of input by members of the affected public on the safety of the plant's underlying design in light of the most recent scientific data available.

In the Court of Appeals, the NRC essentially conceded that this kind of nightmarish scenario is an inevitable, if not intended, consequence of its rule. Thus, under the rule (and the Johnston-Wallop bill), members of the public would, as a practical matter, be foreclosed from ever having their "day in court" on the basic safety of the nuclear plant constructed in their neighborhoods.

4. The Court of Appeals' Rejection of the NRC's Effort to Undermine Public Participation In The Licensing Process

While leaving intact the vast majority of the NRC's new licensing scheme, the Court of Appeals determined that, in its rush to license more nuclear plants, the Commission had run roughshod over the public's right to be heard. Thus, a unanimous three-judge panel—consisting of one Reagan appointee, one Bush appointee, and one Carter appointee—struck down as blatantly illegal those provisions of the NRC's rule that confined the Commission's own pre-operation review, as well as the public's right to be heard, to the narrow question of whether the nuclear plant has been built in accordance with the combined license issued years earlier.

In reaching its decision, the Court highlighted the following "intervening developments" which would not be reviewed by the NRC, or subject to any public input, before the Commission would allow a nuclear plant to go on line: (1) "significant changes in local population density or infrastructure"—such as destruction of a bridge or road that was to have been used for emergency evacuation in the case of an accident, or a ten-fold increase in the size of the population living in the immediate vicinity of the plant; (2) new issues involving "site seismology"—such as the occurrence of an unanticipated earthquake on a site approved years earlier; or (3) "significant new experiences with the plant design or operation"—including a recent serious accident involving another plant with the very same design as the one about to go into operation.

At the same time, the Court of Appeals expressly upheld the Commission's authority to preclude members of the public from rehashing issues that were resolved in earlier proceedings. The Court also confirmed that the NRC has wide discretion to determine whether information raises a new safety "issue" that requires a hearing or, rather, whether such information is not substantial enough to compel the Commission to revisit an issue that was previously considered and resolved.

Simply put, the upshot of the Court of Appeals' finely-tuned decision—which Senators Johnston and Wallop propose to discard—is good law and unassailable public policy: important and previously unconsidered safety issues must be reviewed and resolved before a plant is permitted to operate; issues which are not important or that have previously been considered need not be reheard.

5. The Johnston-Wallop Bill Would Undermine Public Participation In the Same Manner As the NRC's Illegal Rule

The Johnston-Wallop proposal would overrule the Court of Appeals' narrow decision and prevent the public from having input on vital safety issues. Thus, Title XIII of the Johnston-Wallop bill would essentially codify the NRC's unlawful rule by providing that, following the issuance of a combined license and the completion of construction, a member of the public may only obtain a hearing upon making a showing that "there has been nonconformance with the combined license." Under this standard, as explained above, members of the public would have no right to a hearing on a myriad of crucial, safety-related developments.

For example, the Johnston-Wallop bill would preclude persons who reside in the neighborhood of a nuclear plant from having input—before the plant begins to operate—on such matters as (1) new scientific data bearing on the safety of the underlying design of the plant, (2) developments which may complicate emergency planning and evacuation in the event of an accident, (3) new data suggesting that the site is susceptible to earthquakes or other extraordinary conditions, and (4) new data bearing on environmental issues, such as whether the plant will poison an aquifer used for drinking water. Indeed, under the bill, the NRC itself would have no basis on which to hold a hearing on these and other similar issues before a plant is permitted to operate, since the bill provides that, so long as the plant has been built in accordance with its combined license, "operation may proceed."

Moreover, even with respect to issues that do focus narrowly on whether the power plant has been constructed in accordance with the combined license, the Johnston-Wallop amendment would erect essentially insurmountable barriers to public participation. Thus, a member of the public could only obtain a hearing in such circumstances by convincing the Commission that (1) a "substantial dispute of material fact exists that has not been previously considered by the Commission," (2) this issue "cannot be resolved with sufficient accuracy except at a hearing," and (3) the "nonconformance" with the combined license that is pinpointed by a member of the public "could materially and adversely affect the safe operation of the facility." Given the NRC's thinly-veiled hostility to public participation in the licensing process, it will be impossible for members of the public to convince the Commission that these discretionary standards have been satisfied and thus a hearing is in order.

For example, even if a utility whistleblower were willing to testify that there were serious construction defects in the plant, the NRC could, under the Johnston-Wallop proposal, refuse to hold a public hearing on the grounds that there is no "substantial dispute of material fact," or that the matter could be "resolved with sufficient accuracy" without a hearing. As a practical matter, therefore, the Johnston-Wallop proposal eliminates the public's right to a post-construction hearing on all safety-related issues, including whether the plant has been built in accordance with its combined license.

There is yet another fatal flaw in the bill: it effectively eliminates the public's right to judicial review of adverse NRC decisions. While it is not stated explicitly in the bill, its effect would be to relegate the vital issues mentioned above i.e., developments regarding design safety, evacuation planning, and environmental impacts—to the section 2.206 review process. As noted previously, this is a process in which the NRC has complete and unfettered discretion to reject safety-related contentions raised by public groups and states, since the courts have held that there is no judicial review of denials of section 2.206 petitions. It should come as no surprise, therefore, that the NRC denies virtually every section 2.206 petition it receives. In fact, the Commission has not held a single hearing in response to the approximately 90 section 2.206 petitions it has received since 1986.

The patent inadequacy of the section 2.206 process—and, specifically, the lack of any judicial review—was one of the central reasons why the Court of Appeals struck down the NRC's illegal rule. Hence, by reviving the rule, the Johnston-Wallop

amendment would not only eliminate the public's right to a hearing before the Commission, but it would also discard one of our system's fundamental checks against arbitrary and abusive governmental action: the right to seek judicial review and redress.

6. The Johnston-Wallop Proposal Should Be Rejected As Unnecessary, Unwise, and Unfair

Senators Johnston and Wallop have, to date, been less than straightforward with the Congress and the public in drafting, characterizing, and explaining the purpose and significance of their licensing "reforms." Thus, their sole stated justification for the proposal—that they are simply seeking to "clarif[y]" the NRC's authority—is disingenuous in the extreme.[6] Since three members of the Court of Appeals, including two avowed strict constructionists (Judges Thomas and Sentelle) had no trouble concluding that the NRC's rule violates the "express mandate" and "plain meaning" of the Atomic Energy Act, it is obvious that what is being attempted is not a "clarification."

Rather, it is a frontal assault on the bedrock principle of our democracy that persons whose health and safety may be placed at jeopardy at least have a right to be heard—by both the bureaucracy which holds the public's fate in its hands and, if the bureaucracy acts arbitrarily, a court of law. Senators Johnston and Wallop are striving to upset the longstanding balance—which was struck by Congress in 1954 and recently reaffirmed by the Court of Appeals—between the need to safeguard the public health, safety, and environment, and the nuclear industry's desire to operate with as few checks as possible.

It is not surprising that the NRC and nuclear industry and their champions in Congress—have resorted to the tired tactic of characterizing their proposals as benign-sounding "clarifications" and "reforms," rather than acknowledge them as the radical policy departures they actually are. The bottom line is that the proponents of these drastic changes are utterly unable to demonstrate that the current licensing system—as recently revamped by the NRC—is fundamentally flawed or, if it is, that the way to fix it is by cutting the public out of the process.

a. The Johnston-Wallop Bill Is Unnecessary

First and most fundamentally, the Johnston-Wallop proposal is unnecessary because, as the NRC has flatly admitted, there is no evidence to suggest that startup of even a single reactor has been delayed because of public hearings. Indeed, the following colloquy between the Commission and former Chairman of the House Subcommittee on Energy Conservation and Power rebuts any assertion that S. 341 is needed to expedite licensing:

> Representative Swift: How often have intervenors or hearings delayed the startup of a reactor past the time when construction has been completed?
>
> Former NRC Chairman Palladino: Mr. Chairman, I guess *the answer is really none, in the end, has been held up* . . .
>
> Former Commissioner Asselstine: I think *the answer to your question clearly is no. There aren't any cases in which we can point to hearing-caused delays in the operation of a plant* . . .
>
> Former Commissioner Gilinsky: On the subject of delays, Mr. Chairman, there was a good deal of talk about this a couple of years ago, about the impending delays that were about to come upon us, and all the things that needed to be done to make sure that 33 plants got licensed in the following 2 years. Well, we are at the end of that process, and it turns out that *none of these plants were delayed by NRC proceedings* . . . It turned out that the schedules that had been given to us [by the utilities] were simply wildly optimistic.[7]

Second, since this colloquy took place before the NRC's overhaul of its licensing system—most of which has survived judicial review—there is now, if possible, even less of a case to be made that short-circuiting public participation is necessary to expedite licensing. Among other things, the Commission now has the power to approve generic designs, grant early site permits, and issue combined construction permits and operating licenses—changes which, according to the Commission, will streamline the licensing process, and ensure that all issues which can be resolved at an early stage are so resolved.

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[6] 102 Cong. Rec. S1512 (Feb. 5, 1991).

[7] 1983 House Hearings at 104-105 (emphasis added)

Indeed, following the Court of Appeals' decision, the thing that the Commission cannot do—before it gives the green light to operation—is refuse to hear the affected public's views on serious safety-related issues which the Commission has not and could not have previously considered and resolved. The NRC cannot seriously maintain that this single restraint on its authority will undermine its efforts to streamline the licensing process, especially in light of the many sweeping reforms that remain in effect. Moreover, on those relatively infrequent occasions where there are serious safety issues that have not previously been considered, it is evident that operation of the plant should be delayed until such issues are aired in public hearings and resolved by the Commission.

b. The Johnston-Wallop Proposal Is Unwise

First, by precluding members of the public from being heard on serious safety-related issues and developments prior to plant operation, S. 341 would substantially increase the risk that unsafe plants will be permitted to operate. The Chief of the Atomic Safety and Licensing Board summarized the safety-related benefits of the hearing process in 1981:

> (1) Staff and applicant reports subject to public examination are performed with greater care; (2) preparation for public examination of issues frequently creates a new perspective and causes the parties to reexamine or rethink some or all of the questions involved; (3) the quality of staff judgments is improved by a hearing process which requires experts to state their views in writing and then present oral examination in detail and (4) Staff work benefits from two decades of hearings and Board decisions on the almost limitless number of technical judgments that must be made in any given licensing application.[8]

NRC's Special Inquiry Group report on the TMI accident also recognized the importance of public participation to the licensing process:

> Intervenors *have* made an important impact on safety in some instances—sometimes as a catalyst in the prehearing stage of proceedings, sometimes by forcing more thorough review of an issue or improved review procedures on a reluctant agency. More important, the promotion of *effective* citizen participation is a necessary goal of the regulatory system, appropriately demanded by the public.[9]

Despite the enormous obstacles to effective public participation that now exist, public involvement contributed to the following safety-related improvements in specific nuclear plants, among others:

Design and training improvements at St. Lucie (in Florida) to cope with offsite power grid instabilities;

Improvements in the steam generator system at Prairie Island (in Minnesota);

Additional requirements for turbine blade inspections and overspeed detection at North Anna (in Virginia);

Improvement and conformation of the plume exposure pathway Emergency Planning Zone at San Onofre;

Upgraded effluent-treatment systems at Palisades (in Michigan) and Dresden (in Illinois);

A total revamping of the NRC's site-review process as a result of contentions raised during the Pilgrim 2 proceedings (in Massachusetts);

Safer storage for replaced steam generators at Turkey Point (in Florida);

Upgraded requirements at Beaver Valley (in Pennsylvania) for steam generator tube-leakage plugging.[10]

On the other side of the coin, the case of the Grand Gulf 1 reactor, where there were no public intervenors in the licensing process, illustrates the adverse effects that the Johnston-Wallop bill would have on the public's health and safety. After the plant was granted an operating license, the NRC staff discovered that the conditions specified in the reactor's license contained over a thousand errors, operators were unqualified, training records were apparently falsified, and there were design errors in a number of safety systems.[11] Many of these are precisely the kind of

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[8] B. Paul Cotter Jr., Memorandum to NRC Commissioner Ahearne on the NRC Hearing Process (May 1, 1981), at 8.

[9] *Three Mile Island: A Report to the Commissioners and to the Public* ("Rogovin Report") (Jan. 1980), at 143-44 (emphasis added).

[10] Source: Union of Concerned Scientists, *Safety Second: A Critical Evaluation of the NRC's First Decade* 78-79 (Feb. 1985) ("Safety Second").

[11] Safety Second at 82.

problems that members of the public would be precluded from raising under the Johnston-Wallop proposal.

Second, separate and apart from the public's right to participate in the licensing process, the Johnston-Wallop bill would hamstring the NRC itself in its ability to safeguard the public health and safety. Indeed, both the intention and effect of the bill would be to restrict the NRC's pre-operation review to whether the plant has been constructed in accordance with the combined license. Under the bill, so long as a plant is deemed to be in compliance with the combined license, then the NRC would have no authority to prevent it from going on line, at least without initiating an expensive enforcement proceeding to amend or rescind the license.

As both a legal and practical matter, therefore, S. 341 would make it enormously difficult for the NRC to prevent operation of a nuclear plant on the basis of safety-related developments falling outside the four corners of the combined license, such as new scientific studies regarding the underlying design of the plant or changes in population density or transportation patterns in the area surrounding the plant. While this may not have much practical significance at the current time—given the NRC's current composition and pro-industry stance it may make an enormous difference if Commissioners are appointed at some time in the future who take their public safety mission more seriously, but who find themselves statutorily-straitjacketed in their efforts to carry out that mission.

Third, even for staunch advocates of nuclear power, the Johnston-Wallop bill is short-sighted and counterproductive. Indeed, there is probably no better way to further erode the public's already declining confidence in nuclear power than by enacting legislation whose primary purpose is to short-circuit public participation in the licensing process

c. The Johnston-Wallop Bill Is Unfair to Members of the Affected Public, as Well as States and Local Governments

First, the Johnston-Wallop bill would significantly heighten the already substantial barriers that the NRC has erected to meaningful public participation in the licensing process. As explained above, 99% of the NRC's efforts to "streamline" and "reform" the licensing process—many of which will make it far more difficult for public groups and states to contribute to the process—have not been challenged or invalidated in Court.

It would be an extreme injustice for Congress to revive the one aspect of the NRC's rule which even a conservative panel of the Court of Appeals regarded as going overboard in restricting the affected public's right to be heard. And if Congress were to consider such a step, then it would be appropriate for it also to consider the wisdom and cumulative effect of all of the other obstacles that the NRC has placed in the path of public participation, such as the Commission's self-endowed power to issue early site permits and generic design certifications.

Second, in addition to eliminating the public's right to a hearing at the administrative level, S. 341 is also designed to close the courthouse doors to the public by foreclosing judicial review of adverse NRC decisions. At the same time, of course, the ability of utilities to seek judicial review of Commission actions that injure them would remain as potent as ever. It is impossible to justify a licensing system under which one party has a greater right of access to the courts than the other—yet that is precisely what will occur if this ill-conceived proposal becomes law.

Third, the Johnston-Wallop bill would breach a contract that was struck with the American people—and their state and local representatives—35 years ago. As explained by former NRC Commissioner Bradford:

> The current NRC adjudicatory hearing process was developed as part of a bargain from which the nuclear power industry gained a great deal in the late 1950's. In return for accepting extensive federal hearings, the industry was exempted from any state or local regulation of radiological health and safety and received the limitations on liability that are set forth in the Price-Anderson Act. Thus, citizens in any community in which a nuclear facility was to be located—a facility with a remote but not nonexistent chance of destroying the community—gave up both local regulation of the facility and the additional financial and safety assurances that normal insurance industry operations would have brought . . . In return they got a commitment to the full panoply of trial-type procedures as part of the federal licensing process. Now that memories have faded, the industry is seeking to revoke its share of the concessions in that original bargain.[12]

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[12] 1983 House Hearing at 172.

In short, it would be patently unfair to allow the nuclear industry to renegotiate only one-half of the deal that was struck when the AEA was enacted. Hence, if Congress allows the nuclear industry to renege on the commitment to full public participation in the licensing process, then it is also incumbent on Congress to revisit the concessions made by the public in the original compromise, such as federal preemption of the right of state and local governments to establish health, safety, and environmental standards for nuclear plants located within their borders.

The CHAIRMAN. I just do not think that that is true. You say it prevents the public from doing that?

Mr. GLITZENSTEIN. That is correct. That is correct, Senator. I will explain how it does that.

The CHAIRMAN. Well, you are familiar with the language which says: "In the absence of any good cause being shown to the Commission why operation should not proceed in accordance with the combined license." You re saying that significant safety matters would not be good cause?

Mr. GLITZENSTEIN. Mr. Chairman, there are plenty of significant safety matters. Some were identified by a Court of Appeals panel, that I would just add as an aside consisted of not only a Carter-appointed judge, but a Reagan-appointed judge and a Bush-appointed judge, too, so we are not talking about a radical panel.

The CHAIRMAN. I do not think that has anything to do with it.

Mr. GLITZENSTEIN. Well, but I was going to answer your question by referring to the examples that that panel referred to as matters that would fall outside, quite possibly at least could fall outside, the four corners of the combined license, yet would be significant safety-related developments that would not have previously been subject to a hearing.

One of the key examples relates to evacuation and emergency plans, which is one of the central things that the nuclear industry seems intent on ensuring the public cannot have subsequent participation in as the process moves along. I will give you a classic example that I think was very persuasive to the Court of Appeals.

If a site is chosen, again perhaps 10, 20, 30 years earlier in the process, a combined license is issued, then somewhere down the road fundamental elements of that evacuation or emergency plan are called into question, become obsolete—for example, let us say the evacuation plan was based upon the existence of a bridge that would be used in the event of an accident. That bridge has since been determined by technicians, scientists, to be inadequate to support the evacuation that would take place.

Under the NRC's rule, and I would submit, Chairman Johnston, under the bill you have proposed, the public would not have a right to a hearing on that very significant safety-related development which took place since the time that the combined license was issued.

Another example——

The CHAIRMAN. I just do not think you fundamentally understand this bill, or indeed the Atomic Energy Act. If I may interrupt, Mr. Rowden, is there not just plenty of statutory authority right now where you have a substantial safety matter that can be brought up? You can suspend a license right now, can you not?

Mr. ROWDEN. The NRC has plenary authority to do that. In addition to that, as I pointed out in my testimony and as I summarized in my comments this morning, there are provisions in the existing

NRC regulations, which this legislation does not disturb, which give the Commission the authority to entertain petitions based upon significant new information or other developments.

The CHAIRMAN. That not right, Mr. Glitzenstein?

Mr. ROWDEN. And if the Commission determines that a hearing is appropriate, it can order a hearing. And if the Commission denies that hearing request, the matter, as the NRC concedes, is reviewable in the Court of Appeals.

Mr. GLITZENSTEIN. Let me explain. Let me respond to that, because I think it gets to the heart of what the problem here is. The Court of Appeals directly addressed that petition process that Mr. Rowden is referring to. The reason why they found that petition process not to be adequate for the purposes of ensuring public participation was at least twofold and possibly threefold.

One, the petition process gives no right to a hearing, period, no right to a hearing. Two, it vests complete and unfettered discretion in the NRC to respond to that what is called a section 2.206 petition in the parlance of the NRC, as it sees fit.

Three, related to that, the Courts of Appeals to date, despite Mr. Rowden's protestation to the contrary a moment ago, have held, including the D.C. Circuit, the same court that ruled on the NRC's rules recently, that there is no judicial review of denials of section 2.206 petitions, period. That is in the Court of Appeals decision.

The CHAIRMAN. I mean, it does not prevent that. It does not require it, but it does not prevent.

Mr. GLITZENSTEIN. It does, it prevents it, and I will tell you why. And this requires some understanding of basic administrative law principles.

There is a Supreme Court decision that took place a number of years ago, I think it was 1985 or 1986, called *Cheney* v. *Heckler*. I would urge the committee to take a look at that decision, because it formed the foundation of the reason why courts since then have said there is no judicial review of denials of section 2.206 petitions.

What the Supreme Court said was that, when an administrative agency declines to act on what is called an enforcement petition—basically, they analogize it to requests for prosecutorial action and, as I am sure the chairman knows, traditionally the courts have said that enforcement decisions, prosecutorial discretion decisions, are not reviewable by courts.

That is the line of reasoning that courts reviewing section 2.206 petitions have followed in saying that denials of 2.206 petitions, no matter how serious the safety-related issue that may have been presented, are not reviewable by the Courts of Appeals.

I would submit to the chairman and to the rest of the committee that that line of reasoning will most likely continue to be followed, no matter what the context, be it a licensing context or any other context. And that is why this legislation, if enacted, would not only essentially preclude the public from having a hearing on these issues, but would also—I think this is really subject to very little dispute in the legal community.

The CHAIRMAN. Mr. Glitzenstein, I just find it amazing, what you are saying, absolutely amazing. It is just not so.

Mr. GLITZENSTEIN. Senator, I would ask you to read the Court of Appeals decision if you disagree with what I am saying, because they adopted this legal reasoning.

The CHAIRMAN. I can read our own statute here. I mean, you lay out on page 10 a scenario.

Have you read his statement, Mr. Rowden?

Mr. ROWDEN. No, I have not read his statement, Mr. Chairman.

The CHAIRMAN. Well, among other things, you have a license issued 30 years before and then as it gets ready to go into 5 years into construction new scientific studies are published which raise serious previously unconsidered safety issues regarding the design of the plant. And then you say that our legislation prevents a public hearing on that.

It does not prevent a public hearing. To the contrary, it says if you show good cause or a substantial dispute of material fact, that they will have a hearing.

Mr. GLITZENSTEIN. Senator, with all deference, what it says is that if you show a substantial dispute of material fact as to compliance with the terms of the combined license, the acceptance criteria. If there is a fundamental development respecting the underlying design of the plant, it probably will not, in fact it almost certainly will not—and I would certainly ask Mr. Rowden to comment on this, because this is my understanding—will not be reflected in the combined license itself.

Mr. ROWDEN. Well, I do not want to intrude into Mr. Glitzenstein's testimony. But since I have been asked to comment, Senator, I will take the opportunity with your indulgence.

I do not want to get into a re-argument of the matter, which is now pending before the courts. The fact of the matter is that the NRC has taken the position, which NUMARC, my client, as an intervenor has supported, that the type of 2.206 proceeding which is provided for in the part 52 regulations does result in a determination which is judicially reviewable.

Now, that cannot confer jurisdiction on a court, but it is an important statement on the part of the administrative agency with the most direct interest that this matter is judicially reviewable. That is observation number one.

But let us put the legal considerations aside. Let us look at this from a policy standpoint, because this is legislation. The basic point I would make here is that one cannot look at the matter of public participation in the licensing process, which has an undoubted social value, in isolation from all of the other objectives and provisions of the overall licensing process.

We have in part 52 and as I understand we have as an aim of this legislation encouragement of a program of design standardization, of the development, of the submittal for regulatory review, and the approval after full public participation of final standardized designs, a process which entails a commitment of hundreds of millions of dollars on the part of the design developers.

The only basis upon which that commitment is going to be made is if there is some assurance of issue finality once the design certification has been approved.

Similarly, at the combined license stage it is an objective of the NRC regulations, as it is of this legislation as I understand it, to

obtain final resolution of all design and site safety and related issues, including emergency planning, after a full public hearing. The only basis on which a utility is going to come forward and expend now billions of dollars in making a commitment to a facility at that site is if there is some assurance of design finality.

This does not mean that there cannot be extraordinary circumstances where new materials, new information, is uncovered or new developments show the need for further examination of particular matters, in the Commission's discretion, at their own initiative, and my experience is they have been zealous in this regard, or if some interested party brings it to the attention of the Commission.

What we are talking about is not whether this new information will be considered, but the procedures for their consideration. That is what part 52 deals with in this regard. That is what I understand that this legislation is intended to deal with in that regard.

The CHAIRMAN. I mean, if there is a new issue, new scientific studies that bring up some new issue, which Mr. Glitzenstein talks about, they do that under the old AEC law, do they not?

Mr. ROWDEN. Under the law as it exists now, you can come to the Commission. You can file a petition. The Commission determines whether that information requires the convening of a proceeding.

Now, Mr. Glitzenstein is correct that under Supreme Court decisions in the past such Commission determinations have been held to be non-reviewable by the courts. But the Commission has now incorporated that process into its licensing regulations and has taken the position that the determination it now makes on these 2.206 petitions will be reviewable in the courts. That is the important distinction.

I would also point out there are several other important distinctions: (1) in contrast to the normal 2.206 process, it is the Commission itself, not the regulatory staff, which acts on these petitions, and (2) the Commission's regulations oblige the Commission to act on any such petition before allowing a facility to go into operation, meaning it must take such action and that action would be reviewable in the courts.

Now, I submit that that is a balanced and a fair process. We think it is lawful under the Atomic Energy Act as it now exists, and we certainly endorse legislation which would confirm the Commission's authority to establish such a system.

The CHAIRMAN. Mr. Glitzenstein.

Mr. GLITZENSTEIN. Thank you, Senator. A couple points.

One, you asked about the hypothetical. I know that Mr. Rowden has not had an opportunity to review that, but I think it is important to emphasize that in the court case we used the same hypothetical. Neither the NRC nor NUMARC denied that this kind of nightmare scenario could take place under the NRC's rule before it was revised by the Court of Appeals, and I think that the hypothetical makes clear that under the legislation that would be enacted it is quite possible that members of the affected public would have no opportunity, the way this would work along with the design certification proceeding, to have input——

The CHAIRMAN. Would have no right, but there is a difference between having a right to a hearing and being prevented from having a hearing.

Mr. GLITZENSTEIN. That is true.

The CHAIRMAN. You said prevented from having a hearing and no forum, in effect, to make this claim.

Mr. GLITZENSTEIN. That is true.

The CHAIRMAN. The fact of the matter is that the NRC, if you present them a case of new evidence, new scientific studies raising serious previously unconsidered safety concerns—do you really have any doubt that the NRC would consider that?

Mr. GLITZENSTEIN. Senator, we both know that honest and good faith minds can differ about ultimately what is a crucial safety-related issue and what is not. And all we are saying is that certain basic safeguards that are built into our system, that I think you would agree that are built into our system to ensure that those kinds of concerns are considered by an administrative agency and to ensure that an administrative agency does not act in an unreasonable and arbitrary way.

I am sure that this committee has seen a host of instances over the years when administrative agencies, perhaps operating in the best of faith, do turn out to act in a way which is not reasonable.

The CHAIRMAN. Now I think we are getting down to it. You do not mean that they would be prevented from hearing that or prevented from having a hearing. What you mean is that it would be conceivably possible for the NRC to turn down what you would consider to be a serious previously unconsidered safety issue?

Mr. GLITZENSTEIN. Senator, there would be no right to a hearing. I think the way you said it a moment ago is absolutely right. There would be no right to a hearing, in contrast to current law, where there is an right to a hearing on important safety-related developments.

Two, in our minds no right to a hearing frequently transforms itself, at least it has during the last couple of decades, into no opportunity for a hearing.

Three, despite everything that Mr. Rowden says, it is abundantly clear that the courts have played no role in the section 2.206 process, and as a consequence of that the NRC has treated those petitions cavalierly. Over the last 5 or 6 years—may I just make this one final——

The CHAIRMAN. Let me ask one more thing here. Do we also agree that, while the NRC may grant a hearing depending on whether they consider it to be—in fact, they must—the sense of this is that if good cause is shown they must grant a hearing?

Mr. GLITZENSTEIN. If good cause, again, Senator. I think Mr. Rowden would agree with this——

The CHAIRMAN. Reasonable minds might disagree.

Mr. GLITZENSTEIN. If the good cause relates to whether there is conformance with the license. What we are talking about——

The CHAIRMAN. No, that is a separate, that is separate. That is under subsection (ii). There are really two different bases. Up in subsection (b) it says: "In the absence of any good cause being shown to the Commission why operation should not proceed in ac-

cordance with the combined license." That is number one. That gives him the right to a hearing.

Then it further says: "Unless, (i), a showing is made that a substantial dispute of material fact exists that has not been previously considered by the Commission and that cannot be resolved with sufficient accuracy except at a hearing."

So you have got the two different bases in our statute. In addition to that, you have the present language of the present law that, what is it phrased, something about cannot be safely operated. Where does that come from, Mr. Rowden? I am sure you can quote it.

Mr. ROWDEN. Well, there are provisions in the Atomic Energy Act, section 185 and also in section 183, which oblige the Commission to make certain determinations.

Senator Johnston, I might state that——

The CHAIRMAN. That phrase, "could materially and adversely affect the safe operation of the facility."

Mr. ROWDEN. Yes.

The CHAIRMAN. Where is that from? That is from the act, is it not?

Mr. GLITZENSTEIN. Section 103 of the act.

Mr. ROWDEN. Yes, I believe that language is in section 103 of the act.

I might make an observation in this regard. I think I am at least in partial agreement with Mr. Glitzenstein in terms of the way I understand the legislation, and if I do not understand it correctly I will characterize this as the way I would propose the legislation to be drafted. It is my understanding that ultimately title XIII does limit the issues for preoperational hearing as a matter of right to issues of conformance with the license.

The CHAIRMAN. As a matter of right, that is correct.

Mr. ROWDEN. I believe that is contained in the last sentence. What it does not do, and that is the point that I have been trying to make over again, and I think that you have captured it perhaps better than I have, Senator, is prevent the Commission from having a hearing on other matters if it determines the facts warrant it. I think those are the two elements.

The CHAIRMAN. That is all through this. And I think, while you and the NRC may disagree on what conclusion they make, Mr. Glitzenstein, I think I have never heard the NRC accused of being impervious to a substantial claim of danger. I mean, they will hear that claim. And moreover, their failure to hear it is reviewable.

Mr. ROWDEN. In my judgment and in the NRC's submission to the Court of Appeals, the answer to that is in the affirmative, yes, Senator.

The CHAIRMAN. Would you agree with that?

Mr. GLITZENSTEIN. No, I would not agree with that. In fact, when the NRC lawyer was asked by the Court of Appeals, I believe it was Judge Wald who asked the question point blank to the NRC attorney, are you prepared to state here today as a formal matter that would bind the Federal Government in the future that you will not raise an objection to the denial of 2.206 petitions the lack of judicial review? The answer was no.

To this date we have not seen any formal change in that position as far as I am aware.

Mr. ROWDEN. My understanding of the NRC's submission to the court in its petition for reconsideration and rehearing en banc is that it went beyond that.

The CHAIRMAN. Now, Mr. Glitzenstein, on page 5 of your testimony you say that: "Contrary to the popularly held myth, the public hearing aspects of the licensing process has never delayed a single nuclear power plant's operation by a single week."

It did not delay Seabrook and Shoreham?

Mr. GLITZENSTEIN. First of all, Senator, that was not my statement. That is quoting from former NRC Commissioner Peter Bradford, who I think most people would agree is quite knowledgeable about these things.

In answer to your question——

The CHAIRMAN. That is not your statement?

Mr. GLITZENSTEIN. I am saying, I was quoting from Commissioner Bradford.

The CHAIRMAN. Well, do you adopt his statement as your own?

Mr. GLITZENSTEIN. I do, I do. But I just wanted to make it clear that he was somebody who was intimately familiar with how these hearings have taken place.

The CHAIRMAN. I understand.

Mr. GLITZENSTEIN. In answer to your question, however, Mr. Bradford——

The CHAIRMAN. It did not delay Seabrook or Shoreham?

Mr. GLITZENSTEIN. No, what delayed Seabrook and Shoreham was the failure of the Seabrook plant to satisfy then-existing NRC regulatory requirements. All that happened during the hearing process was that members of the public raised the failure of that plant to satisfy NRC requirements, mainly the NRC requirement that at that time States and localities had to participate in emergency evacuation and planning.

Now, as the Senator knows, since that time and largely in response to Seabrook the NRC has changed that requirement and has essentially adopted what is referred to as the rule of reason, under which it is assumed that even reluctant States and localities will ultimately participate in emergency planning and evacuation.

But what held up that hearing, we would submit, and we believe that the record in Seabrook would bear this out as well as Shoreham and the other examples that are commonly used, is that what was going on was that there was a fundamental failure of the utility to satisfy the requirements in effect.

We would submit the way you respond to that problem is by having the NRC, the regulatory agency which establishes these requirements, to review them, as it does on an ongoing basis, and establish those requirements that it believes are necessary. And if the NRC is as protective of public health and safety as everyone hopes it will be and as certainly this committee believes it will be, then the NRC will adopt those safety and health and environmental standards that are consistent with safe operation, but which do not impose unnecessary burdens.

That is what is necessary. And if I could make one further point on that, Mr. Chairman, I think it is crucial to understand that no

one wishes this hearing process to become bogged down in the kinds of delays where crucial issues are not resolved early in the process. That helps no one. That helps no one, including the people who are living in the areas surrounding a plant, including the State and locality, who have a vested interest in where that plant will be located, including the nuclear industry.

Everyone agrees that issues which can be resolved early in the process should be, and I think that the NRC in its overhaul of its rules, 99 percent of which have survived judicial review, makes great strides in showing that that will be the case.

What we are talking about is the small percentage of instances where there are new serious issues which cannot be resolved at an earlier stage. We submit that there is no evidence to suggest that those kinds of issues have inappropriately delayed resolution of licensing issues, and we submit the public should have a right, a right, to participate with respect to those issues.

Mr. ROWDEN. Mr. Chairman, I just might observe that I am sure that the bankrupt New Hampshire utility that was the principal owner of Seabrook and the Long Island utility that found itself in possession of the defunct Shoreham nuclear power project do not look as charitably on the NRC licensing process as some of the comments that I have heard from my respected colleague this morning.

The fact of the matter is the process was a failure in dealing with the issues that should have been dealt with before those plants were licensed for construction. That, rather than how many days' delay was caused, is the real issue.

That is what part 52 is designed to deal with. That is what I understand this legislation is designed to address.

The CHAIRMAN. Under the old licensing procedure, was it not really possible to just rehash the same arguments that had been made before?

Mr. GLITZENSTEIN. To some degree it was, Senator, and I think that everyone again would agree that the NRC has to have authority to ensure that issues which have been considered not be rehashed. It has plenty of authority to do that, and I think Mr. Rowden would agree that that is the case as well, particularly in light of another recent Court of Appeals decision which the Union of Concerned Scientists, who I am testifying on behalf of, lost in the Court of Appeals, where the court said that issues which the NRC believes it has previously considered and has addressed in the terms that are necessary to deal with safety considerations need not be reviewed again.

And I think under their part 52 decision——

The CHAIRMAN. But you believe you ought to have a right to review where what?

Mr. GLITZENSTEIN. Where there are significant safety-related developments which either have not or could not have been considered previously.

The CHAIRMAN. Who would determine whether they are significant safety problems?

Mr. GLITZENSTEIN. Well, in terms of the standard that would be applied—and I think this again perhaps may underscore the lack of need for this legislation, quite frankly—there is no question that

the standard would be applied in the first instance by the NRC. We would submit that ultimately that should be and would be subject to judicial review.

But the fact that the NRC would make that determination, does it rise to the level of a significant safety-related issue, really calls into question whether there is any ultimate need for legislation at all, even if one accepts as a preliminary matter, as a threshold matter, that there is a serious problem that needs to be addressed.

The CHAIRMAN. Well, really what you want to be able to do is to have a hearing of right when you allege that there are significant safety problems, is that not right?

Mr. GLITZENSTEIN. No, I do not think that is right.

The CHAIRMAN. And then to be able to appeal from that?

Mr. GLITZENSTEIN. I do not think that is right. I think that the right way to characterize it is that when we can satisfy a standard that the NRC itself articulates, however that standard is ultimately fleshed out, we believe then that there should be a right, if we satisfy that standard, to a hearing.

And if the NRC arbitrarily denies our right to a hearing, even after conceding, for example, that yes, we have satisfied that standard, then there should be a right to judicial review.

The CHAIRMAN. I have been trying to determine where your standard would disagree with that shown here, good cause shown why the operation should not proceed, substantial dispute of material fact. Where do you disagree with that?

Mr. GLITZENSTEIN. With all deference—and I think Mr. Rowden has now agreed with me on this—that standard does not apply to new significant safety-related developments that arise since the operating license was issued. That standard applies, as I understand it and I think Mr. Rowden was concurring on this, applies to whether there has been compliance with the terms of the combined license.

The CHAIRMAN. Well, how about good cause?

Mr. GLITZENSTEIN. Again, I think that standard, all of those subparts of the standard, are various things that the public would have to satisfy simply in order to get a hearing on whether there has been compliance with the combined license. They do not go to what standard, if any, would be applied by the Commission in determining whether or not there would be a hearing on significant safety-related developments that fall outside the combined license, and that is what we are trying to drive home.

Senator, if you were to change that legislation or to clarify it to make it clear that that standard would also apply to significant safety-related developments that fall outside the operating license, I think that members of the public would have far less concerns about this legislation. And if that is what your reading of it, I think they would be less concerned about it.

The CHAIRMAN. Well, let me ask you, the phrase presently in the law, "could materially and adversely affect the safety operation of the facility," that is still in the law, is it not?

Mr. GLITZENSTEIN. That is the guiding ultimate standard that the NRC is supposed to use in carrying out its functions. But I think everyone would agree that that does not in any way whatsoever

even attempt to sit down and define the circumstances under which the public would have a right to participate in the process.

That is done through sections 185 and 189, which the Court of Appeals was construing in the court case.

The CHAIRMAN. Well, if you could show that there is a new safety development that could materially and adversely affect the safe operation of the facility, wherein does that differ from the standard you are articulating?

Mr. GLITZENSTEIN. The question is not the ultimate standard the NRC applies in performing its responsibilities. The standard that your legislation basically establishes for issues relating to conformance with the license, which we also think a similar standard should be applied to other issues, relates to when the public will have a right to have some kind of a hearing on the process.

The CHAIRMAN. Well, if the public shows good cause they have a right to a hearing.

Mr. GLITZENSTEIN. Not under your proposed legislation as I understand it, and not under section 103 of the Atomic Energy Act, which is not a self-effectuating right to a hearing, which is why Congress in 1954 felt it necessary to enact sections 185 and 189 of the Atomic Energy Act, which do flesh out the circumstances and standards under which hearings will be held.

The CHAIRMAN. If you will read on page 211 there, it says: "And in the absence of any good cause being shown to the Commission, operation may proceed notwithstanding the pendency of a request for a hearing." Now, that means if good cause is shown operation may not proceed notwithstanding the pendency of a hearing.

If you show good cause, you are entitled to a hearing.

Mr. GLITZENSTEIN. Senator, if, despite my understanding of the legislation prior to this date, the committee believes that the legislation be construed so as to provide a right under circumstances falling outside compliance with the combined license, then many of our concerns would disappear.

Mr. ROWDEN. My concerns would be reactivated, Senator. I had not read the legislation that way. I had, frankly, read the legislation as intending to give content to the good cause standard by defining what would constitute good cause, and that is what clauses 1 and 2 are intended to do.

This is reinforced by the final sentence, which says: "Any hearing held shall be limited to issues of nonconformance with the combined license."

The CHAIRMAN. You can suspend a license for a showing of things that would materially and adversely affect the safe operation of the facility.

Mr. GLITZENSTEIN. You can, Senator, but that gets back into the other point. Suspension of a license is an enforcement action. Historically and traditionally, enforcement, prosecutorial type actions have been viewed as completely within the discretion of the administrative agency, and that is why traditionally they have not been subject to judicial review.

So you are basically caught on, I think it is fair to say, something of the horns of the dilemma when you look at it in those terms.

The CHAIRMAN. Well, the question is who determines good cause, and the Commission determines good cause. And as I understand,

you want to be able to have an appealable right to question that good cause by the NRC.

Mr. GLITZENSTEIN. That is correct, Senator. And if the legislation made it clear that that was to be provided, I think that would go a fair distance in alleviating the concerns.

The CHAIRMAN. Well, if you can appeal, you can delay. That has been the history of these things, where you just come in and relitigate the same issues over and over again.

Mr. GLITZENSTEIN. I do not think that is right, Senator, particularly in what we would all concede is an increasingly conservative judicial forum. And I think the lesson of Seabrook is instructive. In Seabrook, when the intervenors attempted to appeal to the Court of Appeals, the same circuit, by the way, and some of the same judges, who were involved in the case we have been talking about today, they asked for a stay of operation of that plant during the time that the appellate proceedings would take place. That stay was denied.

In order to gain a stay under any circumstances, any litigant in the Court of Appeals has to meet a very high standard and, particularly in an increasingly conservative judicial era, where, as we all know, there is substantial deference to administrative agencies, I do not think it would be fair to characterize the process as a likelihood that courts are going to run amok in supervising the NRC's business. I just do not think that is a fair and accurate statement.

Mr. ROWDEN. I have lost my bearings, Senator. I am not sure that I would think it is appropriate to consider as a basis for legislation the particular ideology that prevails in a particular Court of Appeals at a particular point in time. And that is certainly not the way utility boards of directors are going to be looking at business decisions or the investment community is going to be looking at whether the process gives them adequate security or not.

Mr. GLITZENSTEIN. It happens to be the real world, Senator. That is the only reason I bring it up.

The CHAIRMAN. Well, it seems to me that this legislation has all the protections that can possibly be given, and the question is, if you are going to proceed with nuclear energy—by the way, does the Union of Concerned Scientists have a position on whether we should pursue the nuclear option?

Mr. GLITZENSTEIN. The Union of Concerned Scientists, as I understand it, has never taken the position that we should foreclose the nuclear option. I think what they have tried to do is ensure that, if that option is pursued, it is done so in a way which is most consistent with the public health, safety, and environment. I think that is the fairest statement of their position as I understand it.

The CHAIRMAN. Well, 13 years to get a license forecloses the nuclear option, and to have the possibility of that—if you cannot do it in less than 13 years, you just cannot do it.

Mr. ROWDEN. We call Shoreham the "bleak house" of nuclear licensing.

The CHAIRMAN. Well, gentlemen, thank you very much. I would like to continue to pursue this matter. Thank you for your help.

Mr. GLITZENSTEIN. Thank you, Senator.

Mr. ROWDEN. Thank you, Senator.

[Whereupon, at 1:02 p.m., the hearing was adjourned.]

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